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THE

SOUTHERN AGRICULTURIST.

JANUARY, 1837.

PART I.

ORIGINAL COMMUNICATIONS.

On Pisé Buildings.

Charleston, 2d December, 1836.

Mr. Editor,—I am glad to see that this useful mode of building is beginning to occupy the attention of farmers throughout the United States. Since my last communication on the subject, many interrogatories have been made, which, when I wrote, I did not anticipate. I cannot lay before the public anything more interesting, than the following article upon Pisé. which a friend of mine has put into my hands. The following preface explains the history of the work.

In the year 1791, a work was published at Paris, by M. François Cointeraux, containing an account of a method of building strong and durable houses with no other materials than earth, which has been practised for ages in the province of Lyons. It appeared to be attended with so many advantages, that several gentlemen in England, who employ their leisure in the study of rural economy, were induced to make trial of its efficacy; and the event of their experiments has rendered them anxious to extend, by all possible means, the knowledge and practice of so beneficial an art. With a view to promote this desirable end, the account contained in the following pages has been extracted from the French work; and it will be found to contain every necessary information by those into whose hands the original may not have fallen, or who, being unacquainted with the language, may have

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been prevented from consulting it. The appearance of those wretched hovels which are built with mud, in most parts of Ireland, will perhaps dispose many persons to doubt the strength and durability of houses whose walls are composed of no other materials than earth. The French author says, "The possibility of raising the walls of houses two or even three stories high, with earth only, which will sustain floors loaded with the heaviest weights, and of building the largest factories, in this manner, may astonish every one who has not been an eye-witness to such things." But it is hoped that a description of this manner of building will sufficiently explain the reason of its superiority.

Of Pisé and its Origin.

Pisé is a very simple operation: it is merely by compressing earth in moulds or cases, that we may effect the building of houses of any size or height. This art, though at present confined almost to the Lyonese in France, was known and practised at a very early period of antiquity, as appears from a passage in Pliny's Natural History. M. Goiffon, who published a treatise on Pisé in 1772, is of opinion that the art was practised by the Romans, and by them introduced into France; and the Abbé Rozier, in his Journal de Physique, says, that he has discovered some traces of it in Catalonia; so that Spain, like France, has a single Province in which this ancient manner of building has been preserved. The art, however, well deserves to be introduced into more general use; the cheapness of the materials, and the great saving of time and labour which it affords, must recommend it in all places, and on all occasions. But the French auth[or] says, that it will be found particularly useful in hilly countries, where carriage is difficult, and sometimes impracticable; and for farm buildings, which, as they must be made of considerable extent, are usually very expensive.

Method of Working.

Let us not confound pisé with the miserable way of building with clay or mud, mixed with straw, as practised through Ireland. Nothing can, in reality, be more different. Those wretched huts are built in the very worst manner that can be imagined: whereas pisé contains all the best principles of masonry, together with some rules

peculiar to itself. The elevation and plan of a house, the building of which I will regularly describe according to the method of pisé.

The foundation must be of masonry, eighteen inches thick, and may be raised to a foot or eighteen inches above the ground; which is necessary, to secure the walls from moisture or splash. Mark upon them the distance at which the joists are to be set for receiving the mould. These should be three feet each, from centre to centre. This will leave six inches at each end, which serve to lengthen the mould at the angles of the house. After having set the joists in their places, the masonry must be raised between them, six inches higher than the upper side of the joists. Raise the mould immediately on the masonry, as described, placing it over one of the angles of the wall. The head of it, which is to be placed against the angle, should have eighteen inches in breadth at the bottom, and only seventeen inches and a half at top. Thus the sides of the moulds will incline towards each other, and produce the necessary diminution. The wedges must then be driven in, the posts well fixed by cords, and the head of the mould secured by iron pins.

A workman should be placed in each of the three divisions of the mould; the best workman at the angle. He is to direct the work of the other two; and, by occasionally applying a plumb-rule, to take care that the mould does not swerve from its upright position. The labourers who prepare the earth must give it in small quantities to the workmen in the mould, who, after having spread it with their feet, begin to press it with the rammer. They must only receive so much at a time as will cover the bottom of the mould to the thickness of three or four inches. The first strokes of the rammer should be given close to the sides of the mould; but they must be afterwards applied to every other part of the surface. The men should then cross their strokes, so that the earth may be pressed in every direction. Those who stand next to one another in the mould should regulate their strokes so as to beat at the same time under the cord; because that part cannot be got at without difficulty, and must be struck at obliquely. With this precaution, the whole will be equally compressed. The man at the angle of the wall should beat carefully against the head of the mould; and to increase the strength of the building, it is usual to

spread, every six inches high, a layer of mortar near the head. Care must be taken that no fresh earth is received into the mould till the first layer is well beaten, which may be ascertained by striking it with the rammer. The stroke should leave hardly any print on the place. They must proceed in this manner, to ram in layer after layer till the whole mould is full. When this is done, the mould may be taken to pieces, and the earth which it contained will remain firm and upright, about nine feet in length, and two feet and a half in height. The mould may then be replaced for another length, including one inch of that which has first been completed.

When the workmen have gone round the whole building, they must begin upon the partition walls, where the head of the mould must be used to form the door jams.

Such is the method of building which has been practised by the Lyonese for many centuries. Houses thus built are strong, healthy, and very cheap. They will last a great length of time; for the French author says he had pulled down some of them, which, from the title-deeds in the hands of the proprietors, appeared to be above a century old. The rich traders of Lyons have no other way of building their country houses. An outside covering of painting in fresco, which is attended with very little expense, conceals the nature of the building, and is a handsome ornament to the house. That method of painting has more freshness and brilliancy than any other, because water does not impair the colours. No size, oil, or expense is required: manual labour is almost all it costs, with a little red or yellow ochre, or other mineral colours.

Strangers who have sailed upon the Rhone, probably never suspected that those beautiful houses which they saw rising on the hills around them, were built of nothing but earth.

There is every reason for introducing this method of building into all parts of this country, whether we consider the honour of the nation as concerned in the neatness of its villages, and the consequent health of the inhabitants, to which it will greatly contribute (as such houses are never liable to the extremes of heat or cold); or whether we regard the project on an economical or an expeditious scale, by saving both time and labour in building, and rendering the houses thus built almost immediately inha-

bitable after they are finished; for which latter purpose, the holes made for the joists should not be closed up directly, but left for the air to dry the walls more speedily.

Method of forming the openings for Doors and Windows.

The openings for the doors and windows must be left at the time of building the walls. This may be done by placing within the mould either two or one of the heads, wherever the wall is to terminate, and the opening commence. They should be made sloping a little, in order to leave room for the frames and sashes.

On the description of compressed Earth.

Upon beating a small portion of earth, it was found to contain thirty-nine pounds and a half. Fifteen days after, it had lost four pounds and a quarter. In the space of another fifteen days it lost but one pound; and in fifteen days after that, it diminished only half a pound. In the space of forty-five days the moisture was completely evaporated, and its weight was diminished about one-eighth. This small portion of moisture cannot at all affect the solidity and consistency of the earth so treated. This experiment is also sufficient to show the difference between this kind of building, and that vulgar kind, called, in Ireland, "mud walling." The latter cannot be executed without adding a great deal of water, which occupies a considerable space in the mud; leaves, in evaporating, an infinite number of pores or little cavities; and thus the walls become weak and brittle, and incapable of supporting much weight, as beaten earth or pisè can sustain.

On Earth proper for Pisé.

First, All earths in general are fit for that use, when they have not the lightness of poor lands, nor the stiffness of clay.

Secondly, All earths fit for vegetation.

Thirdly, Brick earths.

Fourthly, Strong earths, with a mixture of small gravel, which, for that reason, cannot serve for making either bricks, tiles, or pottery, but make the best pisé.

The following appearances indicate that the earth in which they are found is fit for building. When a pick-axe, spade, or plough brings up large lumps of earth at a time—when arable lands lie in clods or lumps—when

field mice have made themselves subterraneous passages in the earth: all these are favourable signs. When the roads of a village, having been worn away by the water continually running over them, are lower than the other lands, and the sides of those roads support themselves almost upright, it is a sure mark that the pisé may be executed in that village.

Proper earth is found at the bottom of the slopes of low lands that are cultivated, because every year the rain brings down the good earth. It is also found on the banks of rivers. If the earth to be had is not quite fit, it may be mixed to make it so. Strong earths must be tempered with light; those in which clay predominates, with others composed more of chalk and sand; and those of a rich substance with others of a poor nature. It will not be amiss to mix with the earth some small pebbles, gravel, rubbish of mortar, or any small mineral substances: but none of the animal or vegetable kind must be admitted. Such hard substances bind the earth firmly between them; so that well-worked earth, in which there is a mixture of gravel, becomes so hard, at the end of two years, that a chisel must be used to break it, as if it was freestone.

Experiment to ascertain the qualities of any Earth.

Take a small wooden tub without a bottom, dig a hole in the ground, fix a piece of stone or flag at the bottom, place the tub upon the stone, fill round it the earth you dug out, and ram it well, to prevent the tub from bursting; then ram into the tub the earth you intend to try, a little at a time, as described. When the tub is full, loosen the earth around it, and take it out with the compressed earth in it; then turn the tub upside down, and the pisé will come out. If not immediately, let it stand to dry, and it will fall out of itself. Leave the lump to stand some time; and if it do not crack, but increase in hardness, it is fit for building. This experiment may be made in a small box, in the hand. Every person, in walking over his grounds, may make little balls of earth, and press them, as tight as he can, between his hands. If he brings them home, and puts marks on them, he will by that means know the quality of every piece of land, and also be a judge of the mixture it will be necessary to make.

All the operations of this art are very simple and easy. There is nothing to be done but to dig up the earth, break

the clods with a shovel, and to lay it in a heap, where the large lumps are to be drawn away by a rake, in which there may be intervals of an inch and a quarter between the teeth, that the stones and pebbles, of the size of a walnut, may remain.

It is necessary to lay in binders or bonds when the first course is laid, and the mould fixed for the succeeding one. Lay in the bottom of it a board, rough from the saw, about five or six feet long, eight or nine inches broad, and about an inch thick. There will be some inches of earth on each side, by the wall being so much thicker. This will entirely conceal the board in the wall, and prevent its rotting. In the next course, or in the middle of the mould, there may be short ends of boards, laid across so that they shall not come through, but be concealed also in the wall. These may be at two or three feet intervals, and crossing each other at the angles. This will serve much to equalize the pressure. When the wall is completed to the height of a story, boards of three or four feet in length should be placed on the pisé, in those places where the beams and rafters are to be fixed, which may be laid on as soon as the mould no longer occupies that place.

With respect to walls for very large enclosures, there may be two moulds, and two sets of workmen to expedite.

Beside the advantage of strength and cheapness, this method of building possesses that of speed. To give an idea of the time that is necessary to build a house or an enclosure, a mason used to the work can, with the help of his labourer, build in one day, four square yards, or thirty-six square feet of pisé; therefore six men, which is the necessary number to work the mould, will build in one day twelve square yards,* or one hundred and eight square feet; or in a week, six hundred and forty eight feet. By this it is easy to calculate the time necessary for building a house or wall of any dimensions. These facts, which have been proved by numberless instances, afford a criterion by which every one may determine the time that his house or wall will take in building, having first ascertained the number of feet it will contain. Thus if he wishes to have a wall built five hundred and forty feet long, and six feet high, with one mould and six men it will finish eighteen feet running measure, or one hundred

* This is the calculation as translated from M. Cointeraux; which, to render more familiar to the building in this country, is three and a half perches.

and eight square feet, in one day. It will be completed in thirty days, comprehending, in the whole, three thousand two hundred and forty square feet†. As to the expense, it being only the labour, except the mould and the materials (scarcely any thing), the five common labourers at 1 *s.* per day, and the conducting builder at 2 *s.*, make 7 *s.* per day. It will be finished for 10 *l.* 10 *s.*

The plastering and rough-casting, or dashing, should not be done for five or six months after the walls are built, and they should always be built between the months of March and October inclusive. To prepare the walls for plastering, indent them closely with the point of a hammer or hatchet.

By a reference to an article which I published some time since, in your Journal, it will be perceived, that in many particulars the plan of building laid down as above corresponds with my views. I would simply suggest, however, that in the mode of constructing the moulds, &c., I consider my method, not only more simple, but in every respect cheaper.

BARTHOLOMEW CARROLL.

Successful Experiment of the six-acre system in Cotton-culture; by "BEAUFORT."

24th December, 1836.

I accept, Mr. Editor, your invitation to send you a "Christmas present," though, in doing so, I may discover more zeal than knowledge. But, perhaps, I owe your readers, a sequel to a communication inserted in your July number, of which the main purpose was, to recommend to the planters of sea-island cotton, a more liberal use of the plough, in the cultivation of their staple; and, (as a natural consequence,) an extension of the quantity of land cultivated to the hand. The recommendation was founded on actual experiment, but the experiment of one year only: and it is now proper to add, that the *six-acre system*, in which the hoe was aided by the plough, has a second time, and during a season unfavorable to the operations of the latter implement, asserted a decided superiority over the *four-acre system*. carried on by the hoe alone. You must content yourself with the fact, thus generally stated; for I apprehend that the maker of the

† One hundred and four perches.

experiment, would not feel especially flattered by having the precise results spread before the public, and would probably desire to conceal from all but the purchaser, how very small a return he has this year realized from either mode of culture.

In the paper above referred to, I inquired of your correspondent "Colleton," what was the distinctive name of that *fine cotton*, which, in his letter to you, he so highly commended? I wished to know, that I,—that others, might obtain the seed, and share the advantages of the culture. He has kept a most tantalizing silence! In the mean time I have had some hard questions put to myself, and backed by high authorities. "Round O," comes bearing down upon me, with De Candolle on one hand and Macaire on the other, requiring me, to reconcile with their theories and experiments, the assertion, that "with rotation of manures we may *measurably* dispense with rotation of crops."

I am far more familiar with the practice of agriculture, than with the authorities he quotes; but will attempt, that "full and plain" explanation of my meaning, which your correspondent desires; though at the expense, possibly, of that figure of speech in which planters are thought sometimes to indulge—I mean "the rigmarole."

It is now seven-and-twenty years, (I wish it was less,) since I have given my attention, (*occasional* I must own,) to the culture of sea-island cotton. I began upon lands light and generous, but over-worked and over-pastured. I was appalled at the bare naked look of the fields, and, at an early day adopted by way of remedy, the enclosing system recommended by "Arator." I enclosed three times the quantity of land I required for planting, listed in the weed, and gave two years' rest, *under fence*, to one year's culture. I now discovered that the growth of the plants was obviously increased, but the liability to shed the fruit no way diminished; and with every irregularity of the seasons, they cast the pods and blossoms, and took on a new growth. It happened that, in cutting off an unseemly angle, I had occasion to take in a few acres of land, that having lain several years in pasture, were fed bare by cattle. To my surprise, the cotton grown on that slip of land was decidedly more productive than on the enclosed portion. It did not grow so high, but retained the fruit, while the enclosed portion cast it off, as before. A fire passed acci-

dentally over a part of my enclosed field; on that portion, the cotton produced better than on the remainder of the field. Whether the vegetable matter buried in the list, injured the plants by their fermentation, or by causing too great a porosity, in a soil already sufficiently open, I cannot determine; but I was satisfied, that the enclosing system of "Arator," however good for corn, would not answer for cotton—however suitable for other soils, was unsuitable for mine. If my lands improved, my crops failed; and I was not content to be accumulating capital, while I received no current interest.

The application of salt-marsh-mud, as a manure, to sea-island cotton, came very opportunely, to relieve me from my perplexities. Though my first experiment, made upon rich, flat land, entirely failed, I had no sooner tried the mud upon high, light yellow soil, than I became sensible of its great value. The plants from their first leaving the earth, shewed a deeper green, retained it throughout all vicissitudes of the season, matured earlier, and opened cleaner, than when this manure was not used: but what gratified me most, in the experiment, was, to find that it counteracted the tendency to drop the fruit and take on the second growth—an effect ascribed to the agency of the mud, in attracting moisture to the roots of the plant, and thus preventing, in seasons of drought, that check in the regular growth of the plant, which is the forerunner of the second growth.

A remedy thus found for one of the most formidable diseases to which the plant was liable, the difficulty lay in applying so weighty a manure to the whole surface required for planting. This was, of course, (as an annual measure,) impracticable. Forty cart-loads of mud to the acre was too much to be thought of, wherever the distance of transportation exceeded half a mile. It became, therefore, an object of deep interest, to ascertain whether the mud, wherever applied, would not avail for a second crop. The mudded field was accordingly planted a second year, sometimes helped by salt-marsh, sometimes by a top dressing of compost, and sometimes without the application of any new manure. The experiment succeeded, and after a course of trials, which need not here be repeated, I have settled upon the following course, which, it will be seen, is a rotation of manures, instead of a rotation of crops. The fields most convenient to the marsh

mud are divided into four parts. I mud one fourth—plant cotton. The next year I manure the same land with green marsh—plant cotton. Third year, manure the same land with compost—plant cotton. Fourth year, turn out to rest under fence—or, if needful, mud again, and recommence the series. Why adopt a course like this?—so contrary to the enlightened practice of modern agriculturists, in which rotation of crops constitutes so prominent a feature? I can give no reply more philosophical than this: I have adopted it because I found it most profitable. I have governed myself by results—my second year's planting was the best part of my field; my third year's planting equally good with the best. I have pushed the experiment into the fourth year (mudding again) with the same favourable result; and am now preparing a portion of my field, for a fifth consecutive crop, and shall continue, until I discover some symptoms of a failure or decline.

This is what I mean by "a rotation of manures," and these have been my reasons for adopting it. I admire, as much as your correspondent, "the rotation of crops," deemed so essential in English husbandry, and adopt it wherever our widely different climate and productions enable me to do so without loss. I alternate corn, for example, with potatoes, and sometimes corn with cotton; tap-rooted plants with superficial-rooted plants; but, for obvious reasons, such an alternation must, with us, be limited. And, wherever I cannot profitably feed the tap roots of one order of plants, where I last year fed the superficial roots of another order, I do not attempt it, but pursue instead, the course I have already described. The "excretions" of Macaire have given me no disturbance. They are "superfluous!" very good; but does it appear that mother Earth does not hoard them, like a provident nurse, for future use, for the support of other plants, it may be, for aught we know, of the same species? But they are "noxious" excretions, says your correspondent. Noxious, to what? to the plants? Nature, as the experiment itself shows, knows how to get rid of them. Or, are they noxious to the earth itself? How happens it, if this be so, that a rice field is not poisoned by fifty years unbroken culture; but will yield, by some slight mechanical alteration of the upper soil, or other agricultural appliance, nearly as well as at first?

How is it, that the live-oak—that tree of centuries—does not, by its own roots, poison itself, and all the soil around it? How awkward is nature, in poisoning the soil, through the agency of the old plant, just where it has been arranged in her economy, that the young is most likely to grow?

So long, Mr. Editor, *as I restore to the soil, in the form of manure, more food for plants than I have abstracted in culture*, I shall sleep in tranquillity, without distressing myself about the poison which the growing crops may be imbibing from the roots of their predecessors! If poison there be, my plants are of the true Mithridatic stock, and have fed on it, until they have converted it into wholesome food. BEAUFORT.

Three Experiments on the raising of Corn.

Mr. Editor,—In conformance with your polite request, I furnish you with three experiments, which I made last year, in the raising of corn.

1*st Experiment.*

On a piece of land, well drained, though low, I ploughed up well, one acre for my experiment. This was done sometime in February. About the 10th of April, I planted the land in corn, after the following manner. About five feet apart each way, or in squares of five feet, I made hills, under each of which I deposited one quart of cotton seed (black seed cotton.) This gave me 1764 hills to the acre, which, at the rate of one quart to each hill, took a small fraction over 55 bushels of cotton seed, to manure the entire acre.

During the season, I ploughed between the hills, each way, with the cultivator; once when the corn was two weeks old, and once when it was six weeks old. Besides this working, I hauled and hoed up to each hill, three times during the season, as the corn needed it. I should have stated before this, that I left four stalks in each hill. This gave me 6,056 good stalks to the acre. I did not gather in this corn until the first week in November. As soon as I gathered it in, I shelled it, in a corn-sheller, which was handy, and measured off, as the produce of this acre, 52 bushels 3 quarts of as good flint corn as I ever saw. The seed planted, was the common flint—not selected, except

that the largest ears were planted. I put fifteen or twenty seed in each hill, a practice I always follow, for the following reason: when the superabundant stalks or plants are pulled up, it loosens the earth about those which are left behind, lets in the air and sun to them, and greatly advances the growth of the young plant.

2d Experiment.

This experiment was as follows. An acre of land, adjoining that on which the first experiment was tried, was listed in rows of five feet apart; under the list, cotton seed was scattered, at the rate of 55 bushels to the acre. The listing was done early in March, and, about the 10th of April, I made a bed upon the list, of the same size with beds usually made for corn. I planted the seed fifteen inches apart, on the bed, and left one stalk. I worked this corn the like number of times with the former, and gathered it in the same day. After shelling it out, it measured 46 bushels 5 quarts.

3d Experiment.

This experiment was on the same land with the two former, and was the same in all of its details, with the second experiment, except that, the seed was planted four feet apart on the bed, and two stalks were left to each hill. I gathered, shelled, and measured this corn, at the same time with the other, and its yield was only 39 bushels 15 quarts.

The Blades.

The blades collected from the corn planted as above, stood as follows. The corn planted five feet square, with four stalks, yielded most blades. Next in yield, came the corn planted fifteen inches, with one stalk, and last of the three was the corn planted two feet apart. Satisfied with my experiments, Mr. Editor, and as indicative of my sentiments when I reflect upon what we can do at home, by a little extra labour, I remain, and sign myself,

NO EMIGRANT.

Georgia, Dec. 6th, 1836.

Entomology.—The Grub Worm.

Richland, S. C., Dec., 1836.

Mr. Editor,—In reply to your repeated requests to furnish you with something on the grub-worm, which is so destructive to our corn, I can only say, that after considerable examination of the subject, and after repeated attempts to write, I have persuaded myself that I can send you nothing more exact than the following article, from the pen of Dr. Joseph E. Muse, of Cambridge, well known as an excellent entomologist. The article was published about twenty years ago, and has been recently placed in my hands by a valued friend of New-York, who, like Dr. Muse, has made the science of entomology his study. With every wish for the prosperity of your Journal, I remain, your friend, D.

"I have long been impressed with the opinion, that no branch of science, perhaps more deeply interests the practical farmer, than *Entomology*, and none is generally less regarded. The numerous class of insects that blast the most flattering prospects, are suffered yearly to repeat their ravages, without a serious effort to obviate the evil, and the vast varieties, so useful, are suffered to perish, from the want of knowledge to preserve them. To learn the natural history; to inquire into the habitudes of life; the characters, changes, and metamorphoses, of beings so important, are objects not so frivolous as they may appear to the ostentatious, but superficial observer; it is the only mode rational or practicable, whereby the propagation of the one, and the destruction of the other may be accomplished.

With these views, I have repeated experiments in *Entomology*; and one of the first objects that attracted my attention, was the worm that inhabits the corn, usually called the grub-worm. I had seen a paper on this subject, by Richard Peters, Esq. in which he represents its parent state to be the "*scarabæus volvens*." This fact I doubted, as Mr. Peters had not himself witnessed the experiment reported by him though he believed the fact, and proposed a remedy founded upon it: I doubted it because I had seen the *scarabæus volvens*, in so small a state, as to be almost invisible to the naked eye; upon which the reasoning occurred, that the product of a chrysalis so large, as

must *necessarily* be that of a grub-worm, could not, by analogical inference, be as diminutive as the *scarabæus volvens* is frequently seen and known to be, and consequently, that Judge Peters was deceived. To come at the fact, I carried into the field a large transparent bottle, which I half filled with earth; upon this earth I deposited about a dozen of the worms, which were then devouring the corn, and gave them corn blades to feed upon. In a few weeks, or less perhaps, they disappeared; I searched the earth, and found them chrysalids, enveloped in balls of earth. A considerable time after, I again examined them, and found several of them matured, and extricated from their envelope; others, a soft and white *pupa*, with limbs more or less distinctly formed, in various states of progression, and exhibiting unequivocal proof of their origin, and of the impossibility of mistake or deception. These destructive animals belong to the order "*coleoptera*" of Linnæus, having *crustaceous elytra*, or wing cases, which shut together, and form a longitudinal suture down the back; they are about one quarter of an inch in length, of a shining jet black colour, very quick and active in their movements, and are seen in vast numbers under wheat stacks and in wheat yards.

The brief history of this insect is, that its *larva*, or caterpillar, having fed upon the young corn, descends into the earth about the depth of four inches, where it assumes its state of *chrysalis*, in which it continues until the first of July, when it becomes metamorphosed into the *imago*, or parent, which in autumn, deposits its *ova* in the fields, to undergo a similar series of transitions, which is effected by the heat of the ensuing season.

The obvious preventive, is fall or winter ploughing, at such a depth as will turn up and expose to the frost the *ova* whereby they must perish.

To prove the efficacy of this method, in Dec. 1816, a field which I designed for corn, was ploughed four or five inches deep; the following season, my neighbours' corn fields, as well as those of the county generally, were assailed and nearly ruined by this destructive worm, when mine was almost wholly exempt from their annoyance.

Another insect, the "*curculio*," of which there are nearly one hundred species, belonging also to the *coleopterous* order, commands, from its universal ravages upon both the farmer and the fruiterer, the attetion of every member of

the community, who has it in his power to contribute, in the smallest measure, to the destruction of this ruthless foe to the wealth and luxury of man; which frustrates, by its concealed and wily movements, the most rational and well founded plans, executed by the most ardent and efficient energies of the human mind and body. Are we not inclined to exclaim, with the moral and philosophical Seneca, "*Natura quamte colimus inviti quoque.*" How repugnant to the proud feelings of man, to stoop to combat with this insignificant animalcule? How resistless are the ordinances of nature, which compel us, by acts so humiliating, to admire and adore that complex creation, whereby the great Architect has seen fit to enforce them!

I have made experiments on the *larvæ* of several species of *curculionos*, and have found the parents so nearly similar in *habitat*, metamorphoses, and most other circumstances, that one description will suffice for their whole history; at least of those which I have examined; and the only mark of idiocrasy in the tribes which I have observed, consists in their choice of a *nidus*; selecting, from their peculiarities in this respect alone, the cherry, the plum, or the grain of corn, as their instinctive or innate propensities might incline them.

In a transparent bottle, containing some earth, I deposited several cherries, in which were the *larvæ* of the *curculio*, that infests that fruit; in a few weeks, or rather, as soon as the pulp of the fruit was consumed, which was at different periods, they retreated into the earth, where upon examination some time after, I found they had assumed the state of *crysalis*, which shortly resulted in that of the *imago* or parent; the wings of the insect were not sufficient to accomplish a flight, but merely to assist its ascent of the body of a tree; from which circumstances, I was led to the following reflections and experiments, to test their correctness:

That the remedy must be such as would act, physically, to wit: To interrupt the metamorphosis, by preventing the descent of the *larvæ* into the earth; to expose to the weather, the *pupa*, after its decent; or to intercept in its ascent of the body of the tree, the parent insect; or chemically; by substances, known to be generally deleterious to that class of animals.

The fruit being the *nidus* of the *ovum*, and the earth the *habitat*, in which it is brought to maturity, and makes its

abode, and the *larva*, from its soft and delicate structure, incapable of travelling, or sustaining exposure; when the fruit sustaining the *larva* has fallen, and is rotted and consumed by the insect, the *larva must* descend, by the most direct routs, from its original depository, the fruit, into the earth, its permanent abode, there to undergo the metamorphoses, which will bring it to maturity, and fit it for a new series of depredations, which is so secretly performed, that though myriads are employed, they are never detected in executing their work of detsruction, the deposit of their *ova*. Hence I concluded, that one of the most effectual preventives, would be paving with brick, stone, shells, or some other hard substance, impervious to the soft *larva*, a circular space round the fruit tree, as extensive as the fall of the fruit by which it would be interrupted in its descent into the earth, and consequently perish; or that it might be accomplished, by turning up the earth under the tree to the same extent, and thereby exposing to the inclemency of the weather, the tender *pupa*, of which two methods the former is to be preferred, because thereby you arrest the passage of the *larva* to maturity, and necessarily destroy it. The latter method, if not performed in time, may allow the perfection of the *imago*, and in this state it is unquestionably more hardy and capable of providing another habitation, as secure and comfortable as that of its first election. And by the experiments which I have made its decent and maturity are at uncertain and unequal periods, which would make an insuperable difficulty, in point of time, for performing the operation; if before the decent, it would necessarily be useless; if after the maturity, equally so, for reasons given.

This view of the subject, has led me, repeatedly, to both experiments, which I have fairly and impartially made without the influence of any prejudice, which it might be presumed, my reasoning had connected with, or in favour of the former; the result was, the fruit with which I made the experiment that had been destroyed by *curculiones*. for many years, were in all cases, when I paved or shelled, entirely exempt; in two cases only, when the earth under the tree was turned up, at different seasons, the fruit escaped injury, but from the number that failed, I was inclined to ascribe these two to causes accidental and extrinsic.

The third method proposed, viz: to intercept the parent in its ascent of the body of the tree, by various obstacles which the mind will readily suggest, and thereby prevent its deposit of *ova*, though I have made no experiments upon it, I concieve to be rational, and easily accomplished and with those species of *curculiones*, of which there are many, whose wings do not admit of flight, but assist them only in climbing, it would undoubtedly be effectual.

The fourth remedy which I propose, of a chemical nature, I have made but partial experiments to establish, such as are not yet satisfactory or conclusive; when finished, it will give me pleasure to report them, if the result be successful, by a fair and candid detail of facts.

I fear, I have already trespassed on your patience, and will venture merely to notice the parent of a singular *larvæ*, which some years ago, very generally, throughout the state, as you no doubt remember, threatened to exterminate the whole vegetable creation, as far as it travelled; in whole districts, not a solitary blade of wheat, oats, or rye, nor a remnant escaped its voracious appetite, and the grass was swept, in its march, as if by a scorching fire: so formidable were the destructive multitudes, that fossis, abbatis, and parapets were constructed, to repel their advances, and the ditches were filled with their dead bodies. I deposited in bottles, with earth, several of these *larvæ*, they shortly went into *chrysalis*, and came out a fly of the *lepidopterous* order precisely like the candle-fly, in all respects. This result, I report, bacause numerous as they were, and as much alarm as they occasioned, I have never seen a notice of a similar experiment; and it may, in case of a return of these hosts of enemies, afford a clew to their destruction. We at least, are not averse to know something of an enemy, which has, and may again assail us with more diastrous ravages.

If, sir, the present communication shall have have effect of inciting to inquiry, on these interesting subjects, the enterprising and intelligent farmer; if the plan of research which I have ventured to suggest, shall afiord him any assistance; if I have added one ray of light, whereby more may be obtained, my purpose is answered, and my most sanguine expectations fulfilled."

Query on Salt as a Manure for Cotton.

Mr. Editor,—Will you do me the favour to inform me, whether you have ever used Salt as a manure for cotton?—if so, how is it used, and in what quantities? I have been for some years back using the salt-mud, and salt-marsh, with the greatest success; and every one who has tried them can testify to their excellence, as a check to too superabundant growth.

If you can answer my queries, Mr. Editor, or if you can get some of your correspondents to do so, you will confer a favour upon,

ONE INTERESTED.

St. Andrew's Parish, Dec. 12, 1836.

Answer.

We have been giving the subject, about which "One Interested" inquires, the most diligent investigation; and we are happy that it is in our power to offer the desired information.

Common salt, as a manure for plants, has been long known to agriculturists in Europe, and in this country. Its properties are, however, as a stimulant, and not as a nutritive manure. Count Chaptal, in his admirable work on "Chemistry applied to Agriculture," lays it down that, it is in this manner that salt always acts upon the plant; and the experience of every planter bears evidence to his position. What spices and pickles are to man, salt is to vegetables. It serves to increase the appetite of the plant, to invigorate its digestive organs, and to give a healthy tone to all of its functions of life. By combining with the aliments of the plant, and by carrying on a uniform decomposition, it gives a more regular supply of nutrition.

Acting, as salt does, purely as a stimulant, it should, consequeutly, be supplied only in suitable proportions. If it is supplied in too large quantities, it will be absorbed by the organs of the plants in such a manner as to produce irritation and dryness; and it is in this way, that the best soil is sometimes stricken with barrenness.

But to the point in question—How much salt can be used without injury; and in what manner?

The Honorable Whitemarsh B. Seabrook, of Edisto Island, informs us, that for two or three years in succession, he tried the experiment with salt as a manure for cotton. The salt he made use of was common rock-salt, well pounded up; and the land upon which it was applied, if we recollect aright, was of a light sandy nature. He applied it to the task row (105 feet) in quantities, from one pint to one quart. The result was as follows: The row manured with the one pint of salt produced excellent cotton, which from its germination to its maturity, assumed a healthy and vigorous appearance. The cotton bore well, and its staple was strong, and the seed well covered with wool. Wherever a larger amount than one pint was applied, the plant went through the process we have supposed in our general remarks. It grew luxuriantly at first; but, before maturity, it became dry, and seemed gradually to die away with thirst.

As nearly as we can recollect, it was the opinion of Mr. Seabrook, that unless the soil was naturally good, it was best to apply the salt mixed with compost or stable manure. This agrees with the practice laid down by Chaptal and others. Indeed salt, like all other stimulating manures, must have something to act upon. To assume the comparison which we have already used, like the human appetite after being excited by spices, it must have good wholesome food to nourish it.

In addition to the information afforded by Mr. Seabrook, several gentlemen on Edisto Island have made similar experiments, with the same success. Though few of them have applied salt in its unmixed state, they have, most of them, applied it when mixed with compost and other nutritive manures. As to its effects, all seem to agree, that it acts beneficially upon plants; and more so, perhaps, upon the cotton plant than upon any other.

That it has a direct tendency in producing fine cottons, is abundantly testified by circumstances within the observation of every one who knows anything of that plant. We must all acknowledge, that, the farther removed from the salts, the soil is, upon which the cotton grows, the more it deteriorates in quality. Dr. Ure, of England, who has written an interesting work on the Cotton Manufacture, and on the natural history and husbandry of the plant, once made an experiment upon two parcels of cotton, to see what quantity of salt they each contained.

The first was upon 5 lbs. of very fine sea-island cotton, which had brought 6*s*. in Liverpool: the other was from 5 lbs. of a coarser cotton of the same sort, which brought only 4*s*. Both of these were burnt, and the salt separated from the ashes of each. We have not the exact result of the experiment before us; but we recollect, that, the ashes of the fine cotton contained a much larger proportion of salt than that of the coarser. From this experiment, and similar others, Dr. Ure was persuaded, that a due proportion of salt entering into the plant, always improved the staple of the cotton.

If these facts be correct, and no one can doubt them, does it not behoove our planters to give the thing a trial. Salt can be readily purchased, at 50 cents per bushel; and if the sweepings of the cellar are purchased, it can be had for much less. At the rate of 1 pint per task-row, 10 quarts and a half (allowing 21 rows to the task) will manure the task, and a little more than a bushel and a third will manure an entire acre. Let our planters consider this matter well; and let them make the experiment.

Before concluding, we would mention one other practical instance of salt having been applied with success to cotton. The late Wm. Edings of Edisto Island, from a barrel filled with sea-water, watered a portion of his field, after listing in the land. The water was poured upon the list, so as to saturate it moderately. The cotton grew well and bore well; and he often assured us, that nothing prevented his making a general practice of the experiment, but the want of proper carts to carry the water. We mention this experiment, not that we would advise its adoption, but only to add another proof of the beneficial effects of salt when applied as a manure. When we take into consideration the small expense of this manure, the ease with which it may be applied to the land, and its undoubted beneficial results, we predict that its general adoption will produce the same effects upon the agricultural interests of this state, that the introduction of calcareous manures have done for Virginia.

EDITOR.

Experiments in growing Irish Potatoes.

During this and the next month, Irish Potatoes may be planted with great advantage. If any thing like a large crop is set, it will be best to prepare the land by a good and deep ploughing, and harrowing, after which the soil should be carefully cleaned from all weeds.

When ready to plant, the field thus prepared should be drilled off in trenches four feet apart, and in each trench dung or cotton-seed should be scattered. The seeds or potatoes may be placed at about six inches apart, and the plough running along side of the drill, will very effectually cover them. About two or three weeks after planting, the common harrow may be run over the field so as to level it completely. This pulverizes the soil, and gives the seed an opportunity of easily shooting forth. As soon as the plants have so far shooted, as that the drill can safely be traced from end to end, then the whole field is drilled again as at first, with a very strong furrow, and then the harrows are set immediately to work, after the plough has finished drilling, and the field is levelled again. Any one unacquainted with the system would suppose the crop ruined; but it is far otherwise. The charm of this system consists in the harrow, which completely pulverizes all the larger lumps. The expense, too, may be estimated at about one third of the hand hoeing.

The following extracts, selected from different sources, will afford much useful information to those who are fond of this delightful vegetable.

Comparative produce of different modes of preparing the sets and planting Potatoes.

The following interesting experiments were made by the Messrs. Drummond of Stirling, with the Irish blue potato, on the same piece of ground, and under similar circumstances. The space which each experiment occupied, was forty square yards, which were drilled and dunged at the rate of thirty tons the imperial acre. They were all planted on the 28th May, and raised 12th October, 1832:—

The first plot was planted on the plan recommended by Mr. Knight, Pres. Hort. Soc. The tubers were whole, weighing half a pound each, and were planted at the dis-

tance of six inches in the row, and the rows four feet apart, and lying north and south; forty square yards required nine pounds of sets, and produced 364 pounds of potatoes; being, per acre, 136 bushels of sets, and 550 bushels of produce: net increase, 414 bushels.

The second plot was also planted with similar tubers to the last, at nine inches apart. The seed required weighed sixty pounds, the produce 326 pounds; being, per acre, ninety-one bushels of seed, and 493 bushels of crop: net increase, 402 bushels.

In both these plots the plants were highly vigorous, and early in advance of others planted in the ordinary manner. The potatoes were not too large, but the crop contained a great proportion of small ones.

The third plot was planted the same as the last, but the sets were cut of the common size. The seed required weighed only six pounds, the produce, 276 pounds; being, per acre, nine bushels of seed, and 417 of produce; nett increase, 408 bushels. The plants in this plot grew fast in the autumn, and produced by much the largest potatoes; but they did not ripen well.

The fourth plot was planted with sets cut of the common size. The seed required weighed twelve pounds, and the produce 376 pounds; being, per acre, eighteen bushels of seed, and 568 of produce; nett increase, 550 bushels. The potatoes in the produce of this last lot were the most equal sized.

The result of these experiments (which were conducted with great care) is entirely contrary to Mr. Knight's theory, and consequent practice. (*Quart. Jour. Agr.*, vol. iv. p. 411.) In the *Transactions of the Horticultural Society*, second series, vol. i. p. 445. to 456. (published in August, 1824), an account is given of a number of experiments made with the greatest care and accuracy, under the direction of Professor Lindley, in the garden of the Horticultural Society, the result of which is conformable to that obtained by Messrs. Drummond. It also appears in the same work, that Sir George Mackenzie made experiments of the same kind in Ross-shire, and found the produce decidedly better from sets than from whole potatoes.

The usefulness of earthing up potatoes has been pointed out by Mr. Hayward; and, independently of the effect of earthing up, and other operations between the rows, in

destroying weeds and loosening the soil, we should think his practice the best. He says, that a farmer who simply hoed the soil between the rows of potatoes in one of his fields, had a much larger crop than he had in an adjoining field, where the rows were earthed up with the greatest care. A potato placed an inch only under the surface of the soil will produce a greater number of tubers than one planted at the depth of a foot. "I have no doubt," says Mr. Hayward, "if potatoes are planted shallow, and placed wide enough apart to admit of the stems being laid down after the young potatoes are formed; and if the earth between them was then thrown over five or six inches thick, so as to form a flat surface, that it would increase the crop. But this is a very different operation from that which I object to."

Benefit resulting from the removal of potato blossoms. By a well-conducted experiment on a field of two acres, for which the honorary medal of the Highland Society was given, it appears that one third part of the field, being those drills from which the blossoms were plucked in the bud, produced thirty bolls, two bushels. One third part from which the blossoms were plucked when in full flower produced twenty-seven bolls, three bushels; and one-third part, being those drills on which the plants were allowed to ripen their seed, produced twenty-six bolls. The difference here, in favour of plucking off the blossoms as soon as they appear, instead of allowing them to remain, and ripen their seed, is nearly one sixth part of the produce.

PART II.

SELECTIONS.

[COPIED FROM THE FARMERS' REGISTER.]

Soils.

[From the Farmer's Series of the Library of Useful Knowledge.]

Imperfect as was the knowledge of husbandry in former times, yet our forefathers were enabled to distinguish the qualities of the soil with great accuracy; for those parts which were the most anciently cultivated, and which formed the infield land around their villages, are found at the present day to consist of the best ground when in its natural state; though much of that which has been since broken up has been greatly improved by the application of manures, and the progress of successful cultivation.

The difference in quality of the fruits of the earth—more particularly remarkable in grain—though distinguished in many places by the names of the districts in which the corn is grown, yet does not arise from any other cause than dissimilitude of soil and climate; and the utmost exertions of cultivation can only to a certain degree improve, but never effect any absolute change in the indigenous nature of its productions. This, indeed, is generally admitted, so far as regards soils; but although they may be apparently of the same kind, yet their fertility is materially affected by climate, notwithstanding they may be situated in nearly the same part of the country, and with little variation of level; for although the heat indicated by the thermometer may correspond, yet the temperature of the air is varied according to the aspect of the land—whether exposed to the north or south, and the prevailing winds occasioned by the position of adjacent highlands and vales—and the seasons are thus rendered earlier or later. The natural situation of a farm—independently of its local connexion with roads and markets—is therefore an object of the first importance, and affects its value much more than is commonly supposed, for the estimation of all the vegetable products of this country depend, with very few exceptions, upon the degree of heat which they enjoy during their growth; and it is well known that when the soil is dry, and the harvest early, corn of the same weight yields more saccharine matter than that which is produced under less favourable circumstances.*

* This has been clearly established by the application of the *saccharometer*,—an instrument invented for the use of malsters, brewers, and distillers, for the purpose of ascertaining the strength and value of worts. The common standard by which the value of grain, of apparently equal quality, is usually estimated, is that of the weight in proportion to its cubical measure; and when the corn is to be manufactured into meal, this must ever be a primary object, though subject to many deductions, which also enter into the consideration of the miller. But among those who require it for the purpose of brewing, the saccharometer is a more certain criterion; as, whatever the weight of the grain may be, its strength, or nutritive power, will be in proportion to the quantity of the saccharine matter which it contains.

No two farms can indeed be found precisely situated, in point of soil, situation, climate, and exposure; and a very small difference in any of these circumstances will occasion a very great diversity in their fertility; consequently no rules can be strictly applied to their management. It has, however, been justly observed, 'that farms thus variously soiled are spurs to ingenuity—obliging their occupiers to break through those confined opinions and narrow prejudices which are too frequently contracted in countries where a uniformity of soil and regular routine of management prevail.'*

From the vague manner in which soils are frequently described, and the various acceptation of the same terms in different counties, it is difficult for a farmer who reads an account of the agriculture in any other district than that in which he resides, to judge what relation such a soil may bear to that which he himself occupies. In some parts of England, any loose clay is called marl, and in others it is called loam; while this is defined by one to be a fat earth; and by another, a mixture of clay, sand, and calcareous earth, without stating the proportions. Regarding the latter, it has indeed been remarked by the late Mr. G. Sinclair, that, on referring to books on husbandry and gardening, we are directed to a hazel loam, a brown loam, clayey loam, or to a humid sandy soil, peat earth, garden mould, &c.; but the want of proper definitions of those terms is so perplexing, that it is really impracticable to determine what kind of soil is meant: thus, of upwards of fifty different kinds of soil and composts examined by him in various parts of the kingdom, those under the same name were found to differ greatly in their respective qualities. The method of determining the soils by chemical analysis has, however, been of late years so much simplified by Sir Humphrey Davy, that it is now in the power of every practical person to ascertain their properties, without risk of being mistaken.†

Composition of Soils.

The surface of the earth is composed of various descriptions of matter, chiefly minerals—viz., clay, lime, marl, gyps, fluor, tale, sandstone, slate, quartz, and barytes. These are the names by which geologists distinguish the different kinds of rock (whether in solid masses or pulverized) which compose the superstratum, and which, when reduced to an incoherent mass, forms the soil, or what we call the arable staple of land.

* Marshall's Rural Econ. of Yorkshire, 2nd edit. vol. i. p. 281.

† All soil contains sand, of various degrees of fineness, and impalpable earthy matter; when, therefore, the exact proportions in which these are combined in a soil are ascertained, it shows directly to what class it belongs—whether the loamy, clayey, calcareous, sandy, peaty, &c. Sir H. Davy, however, states, in his Agricultural Chemistry, 'that the term *sandy* should never be applied to any soil that does not contain at least seven-eighths of sand. Sandy soils that effervesce with acids should be distinguished by the name of *calcareous sandy soils*, to note the difference which exists between them and those that are silicious. The term *clayey* should not be applied to any land that contains less than one-sixth of impalpable earthy matter, not considerably effervescing with acids. The term *loam* should be limited to soils containing at least one-third of impalpable earthy matter; and a soil to be considered as *peaty* ought to contain at least one-half of vegetable matter. These may be considered as the genuine characters of soils, and determined by a very simple process—that of washing the impalpable earthy matter of the soil from the sandy portion, and by drying and ascertaining their respective weights; when the application of an acid shows whether it belongs to the calcareous or the silicious kind of soil.—Sinclair's Hort. Gram. Woburn., p. 118.

In order to convey clear ideas of the components of arable soils, brief notices of the different earths may in the first place, be given—in order to lead to a right understanding of how one kind of soil is more fertile than another, and also how any one may be improved by admixture with another.

Clay is an earth consisting of several varieties, differing in colour, tenacity, and some other particulars. Blue clay is found in immense beds, under the channel of rivers, in the bottom of valleys, or forming the superstratum of hills over chalk or limestone. Almost every kind of clay contains qualities favorable to vegetation: more especially those varieties which are decomposable by the action of frost, or the alternate effects of showers and sunshine. A surface of pure clay requires to be long under cultivation before it becomes favorable for the operations of husbandry; but when thoroughly reclaimed, no description of soil yields more abundant crops.

Calx is lime combined with acids. To this description of earth, chalk, powder-chalk, and all the different sorts of marble, belong. The two former are found in vast masses, forming some of our highest hills on the south of England. They no where constitute the arable surface, except on the margins of the hills formed of them; but are discoverable, in a reduced or powdery state, in almost all our best soils. A portion of lime earth is an useful addition to all soils, particularly clays and dried gravel. Being attractive of moisture, it assists the effect of frost on clay, and gives consistence and coolness to light sand in summer.

Marl is calcareous, or lime earth, mixed with clay. The common marl has a soft unctuous feel, and is found in thin strata or in beds, of considerable thickness, in various parts of the kingdom. A marl-pit of this description is a valuable source of riches to the light-land farmer: a good coat of it bestowed on a sandy or gravelly field, effects the greatest improvement—not only by giving consistence to the staple, but also adding a fresh accession of vegetable food; and that called shell-marl acts powerfully upon the improvement of clays.

Gyps is calcareous earth saturated with vitriolic acid. This peculiar earth is found in a loose state at Glipston Quarry, in Northamptonshire, and in several places on the continent. In its solid form it receives the name of alabaster, plaster-stone, or selenites. Being heated, it falls to a fine powder, which, when mixed with water, forms plaster. Gypsum has been highly extolled as a manure, particularly for grass land: yet its use, as we have already seen, has not been generally persisted in; but there can be no doubt that it acts as a powerful stimulant to vegetation, and probably future experience may induce its more frequent employment.

These are a few of the names given to the different earths found on the surface of our globe. In beholding their individual structure and stratified appearance, we cannot be otherwise than convinced, that even the hardest were once in a state of fusion; and that the various strata have been, at greater or lesser intervals of time, superposed on each other by the mighty agents of nature. According to their situation or composite character, these strata are denominated, *first*, *second*, or *third* formations. Of these, other deposites are formed, called *shifted formations*—because they have been removed from a first to a second place. In these transitions, fire, as well as water, has been active; as its effects in the disruption, transformation, and elevation of parts of the various strata sufficiently evince.

But it is to that grand convulsion of nature, the flood, and to many local and partial inundations which have since taken place, that the present habitable face of the earth has received its peculiar character as to the undulations, consistence, and qualities of its varied surface; for whether the land emerged from the deep, or was only overflowed for a time, the effects on the surface by the subsiding waters would be the same. Hence we see that the most ponderous and solid accumulations resisted the current, and the loose and lightest were removed to a distance; the different deposites taking place according to their specific gravities, or the strength of the current which bore them along. Of these different earths, deposited as we find them at the present day, the foregoing are the principal. The cultivable surface, or soil, is compounded of dissolved portions of these different earths in various degrees of commixture, each possessing different properties and qualities, more or less favorable to the growth and sustenation of plants; and this according to the quantity of decomposed vegetable or animal matter they may contain. As they differ in constitutional composition, and as they are variously affected by the changes of weather, so also do they require different culture, as remains to be shown.

Clays.

From the brief description already given of this soil, it will appear that it is impervious to, and retentive of, water; and therefore the laying it as dry as possible, is the first and only practical means of improvement. A clayey surface is generally undulating and declivous, consequently favorable for the operations of the drainer. Diagonal, or gently winding furrows, or underground drains, carry off water much more steadily and effectually than laid in direct or precipitous channels, because there is less hazard of the current being so impetuous as to disturb the retaining sides, or block up by drift the openings of the drains, or course of the furrows. Hence we see in old husbandry the propriety of, or the reasons for laying the lands or ridges in such tortuous or winding directions, and withal so much gathered in the middle. By this disposition of the surface, water is effectually, though slowly discharged; and the whole laid and kept dry.* In laying the surface in due form, the plough is the only efficient implement: but where local circumstances oppose the completion by the plough alone, the spade must be employed. Deep ditches are always necessary in a clayey country; for the soil imbibing but little of hasty showers, heavy rain, or melting snow, outlets should be numerous as well as capacious. Before undertaking an expensive design of underground draining, the depth of the surface stratum of clay should be ascertained; because, if it reposes on a bed of gravel, chalk, or stone, the surface water may be got rid of with but little trouble. Openings made

* It must, however, be admitted, that great loss and inconvenience arise from this ancient mode. In undulating countries the lands are decidedly the best to be as nearly flat as the formation of the furrows will admit; and in low districts, the fall for the water is reduced in equal ratio with the raising of the ridges. This robs the furrows of their due portion of soil; keeps them so full of moisture as to prevent their being made, or kept, free from weeds and aquatic grasses; and renders all the operations of the husbandman more troublesome to perform. On sheep-farms, these hollow furrows ought never to be seen, as the loss occasioned by the death of sheep from getting "overlaid" in them, would amply repay the expense of levelling them, without burying the better soil. For the mode of executing this work, see Reports of Select Farms, No. V. Scoreby. Pp. 13, 14, in the Farmer's Series of the Library of Useful Knowledge.

through the clay in places where surface water naturally settles, will probably allow all excess to sink.

It is hardly necessary to allude to the great advantages arising from the perfect drainage of a clay soil: it gives firmness to the surface, thereby facilitating all the operations of cultivation; it adds an extra warmth to the air above it; manures the crops earlier, and more perfectly; and renders all trespassing of cattle or carriages less injurious.

The next most important aim of the cultivator of clay land is to counteract the natural tendency of it to *run together*. This can only be done by deep ploughing, and incorporating with the staple any kind of friable earth—such as sand, chalk, marl, and manures of all kinds. These, besides enriching the land, keep it more porous, and consequently more penetrable by all atmospheric influences. The deeper the staple, the more fertile it is, and also more manageable on all occasions. Any excess of rain received upon the surface sinks away therefrom to the bottom of the staple, or arable superstratum; and though it may be upheld by the undisturbed pan, it oozes imperceptibly away over it to the lower end of the slope.

Much attention is required with regard to the time, or rather to the state, of a clay soil which is about to be ploughed. If too dry, it breaks up in unmanageable clods, very difficult to be reduced to requisite fineness for sowing; and if too wet, it lies sodden in whole furrows, poached into holes by the feet of cattle, and altogether unreducible by the harrows. The due temperament is when the clods can be crushed without kneading under the foot or roller. In this state it may be got in order for any crop with the common implements.

The general character of clay farms is, that though the crops are abundant, they are cultivated at great annual expense. Great strength of teams and implements, and much tear and wear occur, in consequence of the more frequent need of fallows. When a heavy soil becomes foul with root weeds, there is no remedy like fallowing; its stubborn adhesiveness does not allow of freeing it from weeds by any other means than by repeated ploughing and exposure to a summer's sun. While the weeds are destroyed, the soil is ameliorated; and in autumn is fit to receive a dressing of manure followed by wheat seed. If pretty free from weeds, it may receive what is called a winter fallow—i. e., ploughed in the autumn—lie all winter to be reduced by the frost—and in the spring it will be in order to have seed sowed upon it as soon as it is dry enough to be harrowed. Some such clay soils are regularly fallowed every third year, which is certainly a great loss to the tenant, when not duly provided for by the terms on which he holds his land, and indeed, in all cases to the community; but there appears no remedy—at least, no profitable remedy. For notwithstanding machines have been invented, and much ingenuity exercised, to break and loosen the hardened surface of clay soils for the reception of seed, yet, though a passable crop might follow this breaking or rubbing (as it may be called) of the surface, it was soon found that the deep-rooting perennial weeds were neither checked nor destroyed: so that the practice was soon abandoned. There is, however, some descriptions of heavy land where no fallowing is required. Wheat and beans, or other corn, and clover, succeed each other alternately, and the weeds which are nurtured by the wheat are kept under by the hoe during the growth of the beans. An opposite description of heavy land is called hungry clay: this is commonly mixed with gravel, im-

pregnated with a considerable portion of iron ore. Very few plants enjoy themselves on this kind of soil, and it is only improvable by thorough draining, liberal dressings of lime or chalk, and frequent dunging. In the neighborhood of chalk hills this kind of land is often met with, and is much improved by a coat of pure chalk :—to obtain which, pits are sunk in the fields down to the rock, whence the chalk is drawn in the manner detailed in Ch. XII. In all those countries where chalk abounds, the fields are indented with circular hollows, showing where the rock has been excavated below; and from the very many large dells to be seen in the same districts, now filled with fine old oak trees, it is evident that chalk—either as it is naturally found, or after being burnt into lime—was in very early times extensively used for improving the surface of the land.

Clay is improved by chalk, in consequence of the latter breaking the consistency of the former. If drawn and laid on in the autumn, the frost will reduce the lumps during winter, so that it may be ploughed in at seed-time, or when the field is fallowed up. The pulverizing or reducing effect of chalk on clay is occasioned, as before mentioned, by its power of attracting, at all times, a large portion of water from the earth or air, and this being congealed by frost, swells and disturbs every particle near it. Its mechanical reduction of clay, facilitates all operations, and renders it in every respect fitter for the growth of plants. When chalk is burned and slaked by water, or in the air, before being laid on land, its effects are an immediate and powerful stimulant to vegetation, besides freeing the land from slugs and insects.

Calx or Lime.

It has already been observed that chalk, though one of the primitive earths, is never, in a pure state, found forming an arable surface. It is nevertheless, present, perhaps in all good soils; and, from what has been remarked of its properties above, it should be the endeavour of the farmer to make use of it as much as possible; though in saying this, it must be of course understood that it is to be employed with a due regard to prudence. It is equally beneficial to clay, sand, gravel, and peat-earthy soils; and though not, perhaps, the direct food of plants, is a prime agent in preparing vegetable or animal matter already on the soil to yield nutrition to all.

Caustic lime is supposed to be a preventive against that disease in wheat commonly called smut; not only in preparing wheat seed, but by dressing the land with it before sowing. Whether it be a cure for this disease, is, perhaps, questionable, because we know it is not, in every instance effectual; but we are quite sure that the wheat crop will be greatly improved by such a dressing. Clover leys, intended for wheat, are much infested by slugs, which often, if not prevented, prove ruinous to the crop. In such case, a liberal cast of quicklime should be given before the plough, which will either kill, or so disable the slugs, that no danger need be apprehended from their depredations. If the lime be not given before sowing, it may be applied after the wheat is up if necessary. It may either be sowed by hand from seed-kits, or from a light cart with shovels. Night sowing, when the dew is on the blade, is most effectual; because the slugs are then feeding. If rain fall soon after the lime is sown its burning quality is lost, and no longer offensive to the slugs; in which case another dose will be necessary.

Of the other descriptions of earth, there are only two combinations of them which are particularly interesting to farmers, viz., sand and loam.

Sand and Gravel.

Sand, if dry, is easier, and less expensively cultivated than any other. Though very subject to be infested by quetch, and other running rooted weeds, it is readily cleared of them. The crops raised on sand are sooner ripe, and some descriptions are of finer quality than those from richer and stronger ground; but the bulk is deficient in both corn and straw. The liability of sandy land to suffer from drought is a great drawback on the profits of cultivation. In dry summers the crops are sometimes hardly worth collecting. At the same time no land pays better for improvement, provided the means are at hand, and the force sufficient. Whatever application has a tendency to give it compactness, will also make it more retentive of moisture. For this purpose, clay, marl, chalk, or any other earth of a heavier description, will greatly improve the staple. For sheep husbandry, a sandy soil is well adapted; the treading and tail dress of the flock is invaluable for such land.

Whatever has been observed relative to sand, is equally applicable to *gravels* and all other light land liable to suffer from drought.

Like sands, they possess various gradations of quality, from almost absolute barrenness to great fertility. The former are in general termed *hungry soils*, from their tendency to absorb manure, without any corresponding benefit to the land; but as their staple becomes firmer by the admixture of other earth, so do their properties improve. The richer kind produce every species of grain, and though the looseness of their texture renders them less suited to the cultivation of beans and wheat, yet they are admirably adapted to that of Lent corn. The quality of the grain is likewise good; and being also favorable to the growth of leguminous crops, and artificial grasses, they are commonly called *turnip soils*, from that root being generally cultivated on such land. It may be worked as arable land in any season, and is sound enough in grass to bear stock in winter.

Sometimes clay and gravel lie in alternate strata, *cropping out** on the sides of hills. This is one of the worst descriptions of arable land, in consequence of the great number of land-springs flowing out of it; difficulty of drainage, and its liability (in consequence of stones and clay being so firmly bound together) to become impenetrable by the plough after a dry time. It is in this species of land, too, that we often find both the gravel and clay tinged with the oxide of iron, than which nothing is more injurious to corn crops.

There is another kind of land, very widely spread throughout our southern counties, which, though not properly of a gravelly nature, yet is so intermixed with loose stones of a moderate size, as to bear some resemblance to soils of that description. The staple, indeed, is more commonly of clay than sand, and the stones are chiefly *flints;* which may be justly supposed to affect the quality of the earth with which they are mingled, by imparting to it something of their calcareous nature, for the land in which they are found is very generally fertile. There is in Yorkshire a singular species of it, called red-stone land, which is composed of loams of different qualities, intermixed with a

* A term used by miners to signify the highest edge of the bed of coal, &c., or where it appears on the surface.

greater or less quantity of soft sandy stones, about the ordinary size of flints, and of a dark yellow or orange colour; a species of grit or free-stone. The cultivated soil is in some instances, nearly half of it made up of these stones, and Mr. Marshall describes it as beyond dispute, one of the finest corn soils in the kingdom.'* He likewise mentions instances—which we have also witnessed in some parts of Kent—of great quantities of these stones having been gathered off as an incumbrance to the soil, by which its productiveness was much lowered; but the stones having been returned, it was restored to its former state of fertility.

Loam

is the name given to that kind of soil which appears to be an intimate mixture of all other earths reduced to a fine and equable state. It is of different colours. On elevated table-lands it is mostly red; on gradual slopes it is yellow or hazel; and in the bottom of valleys, it is almost black. The two first appear to be deposites from the general, the last from partial, floods. It is found reposing on stone, on clay, or on gravel, of various depth, sometimes in deep beds, but, in general, always deep enough for the purpose of the farmer. Its consistence is friable, readily admitting air and rain, and as readily discharging all excess of the latter, only retaining or imbibing from the air as much as is necessary to vegetation; and neither liable to be parched in summer, nor drenched and chilled by surface water in winter.

Loam, in its uncultivated state, always contains a notable proportion of that nameless peculiar quality, so nourishing and stimulating to plants, known only as the constituent of virgin or maiden earth—i. e. unexhausted earth. Whatever this quality may be, it is not only more abundant, but also much more permanent in loam, than in any other description of arable land. Besides this property, the facility of its culture must not be forgotten. Except in hard frost, or immediately after a heavy fall of rain, it is ploughed at any time with ease and regularity; harrowed, scarified, hoed, by horse or hand, and rolled effectually. Such a soil rarely suffers from drought, nor are floods ever dreaded. If, from neglect, it be overrun with weeds, they are soon extirpated; and if impoverished by mismanagement it is quickly recovered. It is suitable for every kind of crop, and every system of husbandry; and whether for corn or grass, yields the greatest profit to both landlord and tenant.

Such being the history of a loamy soil, it is coveted by every cultivator, and every industrious one endeavours to bring his land of an opposite character, as near to the standard and nature of loam as possible. The expediency of such attempts is universally admitted; but it is only under particularly favorable circumstances it can be accomplished to any great extent. Covering a large field of sand with clay, or of clay with sand, is a formidable affair, which but few can undertake. Still, as there can be no doubt of immediate advantage, and ultimate success, such an amelioration should never be lost sight of by the farmer, of either a too light or too heavy a soil. Sometimes the opposite qualities lie contiguous, and in a course of years may be brought to improve each other. And though, in many cases, the desired quality may not be on the surface, it may happen to be found at no great distance below, sand and clay being often found stratified with each other.

* Rural Economy of Yorkshire, 2d Ed., vol. i., U. p. 280.

There is also a species of rich loam which, under the name of *alluvial soil*, is understood to mean land which has been gained in low situations by deposites laid by the overflowing of streams from higher grounds, or by the artificial process of warping from the turbid waters of muddy rivers, as well as by slimy matter, thrown up by the tides, and afterwards embanked. This contains a large proportion of vegetable and animal matter, which gives it a dark colour, and produces almost inexhaustible fertility; but the quality of its products, though luxuriant to the eye, are not, as we have already had occasion to remark, equal in nutriment to those grown on drier land. This is not alone observable throughout our own country, but in every other part of the known world; thus, in Valencia, one of the most highly cultivated and the richest districts in all Spain, the soil, though rendered wonderfully fertile through a regular command of water by tanks constructed in the time of the Moors, and appropriated to irrigation, yet its products are found so deficient in real nutriment as to have passed into a proverb expressive of their inferiority in the power of imparting vigour.* So, also, in a large lowland quarter of the island of Martinique, called the *Lamentin*, nothing can exceed the apparent richness of the vegetation: the canes grow to immense size, but the sugar, though beautifully white, is almost an impalpable powder, so scantily possessed of those crystals which constitute its saccharine strength, that it decomposes when carried across the Atlantic, and is almost useless to the refiner.

Peat.

Besides the above-mentioned earths, there is a class of others called *inflammables*, from their property of being combustible. These are coal, bitumen, peat, &c., which, when reduced to powder, and incorporated with, or even spread on, the surface, act beneficially on vegetation. The ashes, too, of these minerals are a good dress, especially for cold moist soils.

That which falls under the denomination of peat, is distinguished in its natural state from every other kind of soil. It is formed of successive layers of heath and other coarse herbage, which spring up and decay upon the sward, without having a temperature of sufficient heat to effect their entire decomposition; but being aided by a certain degree of humidity, they continue to produce other plants which at length constitute that mass of vegetable matter, which is so common in Ireland and Scotland and our northern counties, under the names of bog and peat. It is of a dark colour, and spongy texture; full of fibrous particles in a partial state of decay; tough and elastic: and when dried becomes inflammable. From this description, it might be supposed that it contains the chief elements of fertility; yet experience proves the contrary: for it is found, when in a state of nature, to be so completely barren as hardly to deserve the name of soil, until art and labour have been exerted to bring it into a state fit for tillage. By these

* It is not very expressive of gallantry, and runs thus:—

"*En Valencia, la yerva es agua,*
La carne es yerva,
Los hombres son mugeres,
Y las mugeres—nada."

"In Valencia, the grass is water,
The flesh is grass,
The men are women,
And the women—nothing

means it has, in some instances, been brought to the consistence of a light kind of land, extremely well adapted to the culture of potatoes and other tuberous roots, as well as the lighter species of grain and flax, and somewhat resembling loam. It indeed wears the appearance of a rich mould, and may thus deceive an inexperienced eye; but unless greatly ameliorated by the mixture of some solid earth, it is found, on closer examination, to be loose and porous, quickly saturated with water, and too easily discharged from it.

A late writer on the subject, remarks, "that when we consider the vast extent of the masses of this bog, which, in the cold and temperate regions, overspread so great a portion of the surface of the earth, and which, though full of vegetable matter, is yet little friendly to vegetable life, we may believe that in its history, in its nature, and in its uses, it presents many materials to the agriculturist for inquiry, which may illustrate the means of either converting it into a soil or into manure, for the improvement of other lands; but it must be confessed that these important inquiries have not all been so perfectly answered as is to be desired; and that much yet remains to be learned, of the nature and the uses of peat-moss."*

It only remains to be noticed that there are two other constituents of soils, namely, *salts* and *metals*, and which, where they abound, have a powerful effect on plants. Of the latter, iron is the most frequent, and, when in excess, is prejudicial, especially to corn crops. The ores of other metals, as lead and copper, are also hurtful to vegetation; but this only appears in the near neighborhood of mines.

Of salts, there are many descriptions found in land springs, and usually recommended for medical purposes. Their existence in arable land is, however, imperceptible, unless very near salt springs. Sea, or common mineral salt, though not a food of plants, is, notwithstanding, a useful ingredient, particularly in dry soils. Its great affinity for water assists summer crops wonderfully. It is also an excellent cleanser and renovator of exhausted soils. Slugs will not live where it is in any sensible quantity; and while it is grateful to cultivated plants, it appears to be offensive to moss and all diminutive weeds. Its use as a dress is too much neglected by farmers.

There is thus an endless variety in soils, and those of apparently equal fertility are almost all differently composed. A certain knowledge of chemistry is necessary to ascertain in what those differences consist; for it is in the accuracy with which they are described that the best modes of remedying their defects, and improving them by the application of either lime, clay, sand, or other fossil substances, can be discovered. Farmers, however, generally contrive to obtain a tolerably correct notion of their imperfections, by a comparison with the soils of their neighbours, and thus experience in such cases supplies the want of science. The sure indications of a good soil are commonly to be found in the state of the hedges and timber, especially oak and ash—full, wide-spreading tops, presenting an appearance of luxuriant growth; whereas, if stunted, it is a certain sign that the land is poor. The weeds natural to peculiar soils, are also strong proofs of either poverty or fertility. Land is, in certain cases, also to be distrusted, although the crops upon it may be fine; for they may have been forced by over manuring, and thus brought to a condition which it may be found very difficult to continue: while, on the contrary, good land,

* Mr. Low, on the Classification of Soils, Qrt. Jour. of Agri., N. S., vol. i. p. 30.

though exhausted by improper cropping, may be easily restored by judicious management.

Few soils are so ungrateful as not to pay the expense of improvement, provided the money laid out upon them be applied with judgment. Many tracts of the poorest sand have been rendered fertile, by judicious dressings of clay, loam, or marl, and other thin and hungry soils have been improved by the application of similar substances; while those of the sourest description have had their acidity corected by lime, chalk, and ashes. It should, however, be borne in mind, that land of any description, which is retentive of water, can never be rendered fit for the plough until it has been completely drained; for otherwise, the operations of tillage cannot be accomplished in due season. Its state will have a direct and prejudicial effect upon its productive powers; and manures can never communicate their full benefit to any soil which rests upon a wet bottom.

On Agricultural Reading.

[FROM THE GENESEE FARMER.]

The advice of the justly celebrated Bakewell, a man who did more, perhaps, to advance the interests of the Agriculturist, and render him prosperous, than any man of the age, to those young friends who as farmers called upon him, was, to "spare no pains to know what others were doing." This could only be done through the medium of agricultural journals, and hence he was, as may well be supposed, one of their ablest advocates, as well as a constant contributor to their pages. Experience has shown, that to be a successful farmer at the present day—to enter the vast field of agricultural competition on equal terms—a man must know what others are doing; he must be acquainted with the improvements in husbandry, in labour-saving machines, in the preparation and application of manures, and with the new and improved breeds of cattle and sheep that have within a few years been introduced.

To possess this knowledge is one thing—to make a judicious use of it is quite another. The first he must acquire from extensive personal observation, or from agricultural works; the last, must be the result of reflection, combined with experience. Without the first, he will be behind the age; without the last, he will be a farmer at random, a mere visionary in theory, incompetent to his business, and a loser in practice. Judgment, sound judgment, is required to render available knowledge, and where these two are combined, the result will be a successful farmer.

Many of these farmers at the present time,—we mean those who make the best use of their capital and realize the greatest profits, are men who enter into competition with long established agriculturists, utterly ignorant, so far as personal superintendence or labour was concerned, with the business of farming. They were professional men, divines, lawyers, merchants, or mechanics; unacquainted with the mechanical part of their new occupation, but bringing to the work minds well stored with varied and useful knowledge, and a thorough acquaintance with the advanced state and best methods of modern agriculture. The voluntary choice of such men, proves that they have a taste for one of the noblest occupations of mankind, and entering upon it with zeal, they meet with a success to which many of those who have been brought up to farming from their infancy remain strangers

It is sometimes said by those who decry agricultural reading, or book farming, as they are pleased to term it, that you cannot *make* a farmer, he must be brought up to it, or he cannot succeed. The celebrated Marshall of England thought differently: he maintained that "attendance and attention will make any man a farmer." He was brought up a merchant, but, at mature age, took a poor farm of three hundred acres in the vicinity of London, and commenced farmer. All his friends prophesied a total failure; but he prepared himself by studying the best agricultural works of the day, and by reflection—superintended his business himself—kept an accurate journal of his operations, which he afterwards published—and became very rich, the Coke or Bakewell of the farmers of his day. The same thing has happened, and is almost daily happening in this State. Professional men and mechanics have become our most able and successful farmers—showing the best regulated and well managed farms—exhibiting the finest cattle, sheep, and hogs—giving a flat contradiction to the doctrine, that books will not make good farmers; and what, in the estimation of many, will be more than all the rest, as furnishing the test and proof of the whole, putting more money in their pockets than any of those who have been regularly bred to the business.

The time has come when the farmer in self-defence must read: not to become a mere theorist or visionary in agriculture; not to keep constantly changing his systems; but steadily improving them; but because to insure success, and keep pace with others, he must know what others are doing. G.

Memoranda, for those who would improve in Husbandry.

[FROM THE CULTIVATOR.]

Draining, manuring, alternating crops, and *root culture*, are the best and cheapest means of increasing the profits of a tillage farm—they form the basis of good husbandry.

1. *Draining*—The first requisite to divest a soil of surplus moisture. Lands that are wet upon the soil, or sub-soil, will not bring good grain or grass. If the evil is owing to surface water, it stagnates in summer, and becomes prejudicial to crops growing upon it, and to animals. If it proceeds from springs, it keeps the temperature of the soil too low for healthy vegetation. In either case it prevents the land being worked early, or during wet seasons, and retards the decomposition of the vegetable matters, which should serve as the food of plants. When properly drained, wet or marshy lands are among the most productive soils, as they generally abound in vegetable matter, accumulated and preserved by water. Without draining, they are comparatively unproductive, and are often nuisances.

2. *Manures* are the true food of plants, be the speculations of theorists what they may. Every farmer may demonstrate this truth in his practice. We can no more obtain good crops from a poor soil, than we can obtain good beef from a lean pasture. Vegetable matters constitute alike the raw material for beef and for corn. The elementary matters of both are materially the same. Every vegetable and every animal substance, or whatever has been such, however nauseous and offensive, contains food for our farm crops: and the fertility of our soil, and the profits of our husbandry, will depend in a great measure upon the economy with which we husband this vegetable food, and the judgment with which we apply it to our crops. Without good crops

we cannot rear good animals; and without animals we cannot have dung to enrich our grounds. Every crop we take from a field serves more or less to exhaust the soil of fertility; and unless we return to it some equivalent in the form of manure, it will in time become a barren waste. Again, as animal and vegetable matters begin to ferment, and to dissipate their fertilizing properties, as soon as they are brought in contact with heat, moisture and air, they should be buried in the soil in the spring at farthest, in an incipient state of fermentation. And as the hoed crops, such as corn, potatoes, beans, ruta baga, &c., thrive best upon the volatile parts of manure, the long manure should be fed to them. The farmer who has a good soil, should take care to keep it good; and he who has a poor soil should strive constantly to make it better, as every advance he makes in improving it increases his productive capital. This preservation, or increase of fertility, cannot be well effected, without a due regard to

3. *Alternating Crops.* Few soils will bear a repetition of the same crop for successive years, even with the aid of dung, without diminution of product, whether in tillage or grass. One reason of this is, that each kind of crop takes from the soil a specific food, which other kinds do not take in like quantity. Hence, during an intermission of four or five years, there is ordinarily restored to the soil the specific food of that kind which it is capable of growing. Cultivated crops are sometimes grouped, in alternate husbandry, in three classes, viz. dry crops, embracing all the small grains, and which are most exhausting; 2d, grass crops, embracing timothy, orchard grass and other perennial varieties, which exhaust less, but which run out, or sensibly diminish in product, in a few years; and 3d green crops, comprising turnips, clover, &c., which pulverize and ameliorate the soil, and exhaust least of all. Where convenient, a crop of one of each of these classes should follow in succession, the grass continuing to occupy the ground while it continues to yield a good crop of hay. If retained too long in grass, the soil becomes too compact, and impervious to the genial influences of heat and air. It is particularly recommended that two dry crops should not succeed each other, except wheat or rye may follow oats, when the latter is made a fallow crop upon an old grass ley. Although the deterioration under a bad system of cropping may be slow, and almost imperceptible, yet both science and experience teach us that it is inevitable, and fatal to the ultimate hopes of the husbandman. Many of the old States afford lamentable evidences of this truth.

4. *Root Culture* is one of the best gifts which modern improvement has bestowed upon husbandry. It gives the most animal food with the least labour; it is, under good management, the most certain in its returns; it gives the most manure; it best ameliorates the soil, and fits it for dry crops; and it affords an important link in the chain of alternation. It is considered the basis of good husbandry in Great Britain, Flanders, Germany and France, and has transformed the county of Norfolk from a waste to the most profitable district in England. Highly as the beet culture is prized in France, as affording a material for the profitable fabrication of sugar, it is no less valued as an alternating crop, and as affording a material for making good beef and mutton. The roots that may enter extensively into our husbandry, are, the potatoe, (and the varieties of these that are best for table, afford the most nutriment to cattle,) ruta baga, mangle wurtzel, carrot, parsnip and sugar beet.

As subsidiary to the preceding cardinal points in good farming, we give the following, which, although they may appear to many to be

hackneyed truisms, are nevertheless so important as to be worth often repeating.

5. *Keep* none but good farm stock, whether as regards breeds or individuals. Sell the worst of your flocks. Like produces like; and the gain in breeding from the best you have, greatly counterbalances the extra price that the prime individual will bring in the market. A cow that gives eighteen quarts of milk per day in June, costs no more in her keep than one that gives but six quarts; yet the product of the first is three-fold, and the profits four-fold, those of the latter. The fleece of the Saxon or Merino sheep is twice as valuable as that of the common one, though the cost of keeping them is equal. And the same corn that will make 100 lbs. of pork upon a long-legged, long-snouted, razor-backed hog, will put 150 or 200 lbs. upon the frame of a Berkshire or other improved breed.

6. Keep your farm stock well. A certain quantity of food must be given to keep them alive, all beyond this goes to increase growth, or is converted into meat, or milk, or wool; and if a little extra food is in this way profitable, much must be proportionably more so, for the more food you thus convert, the greater your return in labour, flesh and milk.

7. Cultivate no more land than you can improve, with a reasonable certainty of handsome net profit, embracing in the items of expenditure the interests on its value, fences, taxes, manure, and labour. The good farmer, who raises 80 bushels of corn on one acre of land, clears the price of 50 bushels, which, at 50 cents the bushel, is $25. The poor farmer, who cultivates *four* acres of corn, and gets thirty bushels on an acre, barely gets compensated for his labour and expense. We estimate the expense of raising and harvesting an acre of corn at $15, or the price of 30 bushels of the grain.

8. Buy good implements and tools, though they cost more than poor ones, and always keep them in repair for use. A good plough is drawn with half the team that a bad one is, and does the work twice as well, provided the ploughman knows how to use it. One good ploughing is better than two bad ones. Hence the farmer is soon compensated for the additional cost of the good article. The same remark holds good in regard to other implements and tools of the farm. In row culture, the cultivator will pay for itself in a season, in the economy of labour; the straw-cutter will do the like in economizing fodder, and the drill-barrow is a subject of equal economy in root-culture.

9. We hardly need admonish the reader to use none but clean good seed: for every man knows that he will reap only what he sows—the cheat controversy to the contrary notwithstanding.

10. And lastly, we should disregard our duty, did we not press upon the consideration of every farmer, the importance of agricultural publications, as the cheapest and most certain means of improving in the practice and profits of his business. These bring to his notice constantly the improvements and discoveries that are going on in the business of agriculture, and they detail the practice of the best farmers of our country. He that does not keep pace with the improvements of the day, in husbandry, as in other arts, cannot long find pleasure or profit in his employment. Those who stand still, and content themselves with the practice of their fathers, will soon find that the business, active world, have all gone ahead of them. But we urge this matter particularly, as an efficient means of instructing and qualifying the young for the duties of mature years—of stimulating them to acquire useful knowledge, and that confidence and self-

respect which should ever characterize the yeomanry of a free country. The seed must be sown, and the mind nurtured in the youth, if we would expect a harvest of respectability and usefulness in the man.

Beets.

FROM THE BIBL. UNIVERSAL, FOR 1831.

Beets furnish from a given surface of ground a greater quantity of nutriment for horses and cattle than any other kind of forage. Wherever its cultivation is understood, it has the preference over all other roots. It succeeds in almost all soils, is but little affected by the vicissitudes of seasons, and prepares the ground very well for succeeding crops.

Throughout Belgium and Germany, the leaves are from time to time stripped off and given to the cattle, which eat them with avidity and easily fatten upon them. Fowls are also fed upon them. They are first hashed up, then mixed with bran. Pigs eat them with a good relish. Milch cows, when fed upon them, fatten at the expense of their milk. The leaves are equally valuable in the fattening of cattle and sheep.

Beets should be gathered when the weather is dry, and put away in a dry state; and when prepared for cattle, they must be cut up fine with some suitable instrument, and may be given either alone or mixed with straw or hay.

They are equally fit for horses, with the precaution of adding a variety of cut straw and hay well mixed together. This food will preserve them strong and vigorous, as is well ascertained in Germany, where beets are much cultivated for this purpose.

For the fattening of a bullock, forty or fifty pounds of beets per day mixed with five or six pounds of dry fodder, will accomplish the object in the space of four months. Care must be taken to give it in three separations, since by feeding often and in small quantities at a time, the same amount of nutriment goes farther.

Finally—by facilitating the means of stable fattening, throughout the year, beets furnish a very important addition to this means of augmenting the mass of valuable manure.

They may serve also, on occasions, for the food of men; they are less subject to the vicissitudes of seasons than turnips, and their leaves supply for several months an excellent food for cattle. The root may easily be preserved during eight months of the year. They give milk an excellent taste and quality. Cattle eat them with great avidity, and are never tired of them.

The culture of no forage root can compare with that of the beet, in the number of advantages which the industrious cultivator may derive from them. We cannot too strongly recommend the introduction of them into places where they are not already in vogue.

Rail Road across the Isthmus of Darien.

FROM THE NEW-BEDFORD MERCURY.

The project of opening a channel of communication across the Isthmus of Darien, which has for many years been a subject of newspaper comment and conjecture, appears now in a train at no very distant period to be realized. It appears by recent intelligence, that the con-

gress of New Grenada, during its last session, which terminated in May, passed an act making a large appropriation of land for a Rail or McAdamised road, granting the same, with the exclusive privilege for forty-five years, to Col. Chas. Biddle, a citizen of the United States, who it is said has acted in soliciting the contract as the agent of several large capitalists in this country. The distance across the Isthmus, from Porto Bello to Panama, is only thirty-seven miles;—but it is interrupted by a considerable rocky elevation forming a part of the chain of the Andes.

The advantages to commerce, should this project finally succeed and be carried into operation, are thus alluded to in the N.Y. Commercial Advertiser:—"The voyage to the Pacific, by the way of Cape Horn, will be in a great measure done away with; and the teas and silks of China, the spices of Polynesia, the furs of the North West coast, and the valuable products of the whale fishery, will reach us by a navigation abbreviated to less than half its present length and consequent expense. The commerce of other nations, too, will of necessity be directed into this new channel of communication. The capes of Good Hope and Horn will no longer be the trial points of weather-beaten mariners; monsoons and trade winds will lose mightily in interest; a vast city will spring into existence with unexampled celerity at either extremity of the road, proudly standing like the citadels of trade, one upon the margin of the Pacific and the other upon that of the Atlantic, gathering toll from every box of tea, every bundle of skins, and every barrel of blubber that finds its way to this country or to Europe; and for anything we know to the contrary, in the course of centuries, a vast system of lateral rail-roads may be created, extending to diverging lines, like the rays of the sun, from the great road between the oceans, to the remotest borders of North and South America, serving as the medium of transportation for all the inland and oriental trade, and so far as this whole western continent is concerned, entirely supplanting all navigation except that of rivers by innumeraple steamboats. Political consequences of no less magnitude may perhaps be in like manner produced, but we have not time or space at the present writing for even a random conjecture of their extent and nature."

Economical method of keeping Horses; by Henry Sully, M.D.

[FROM THE FARMER AND MECHANIC.]

Having received innumerable letters from gentlemen who keep horses, requesting a description of my plan of feeding, I shall save much trouble both to others as well as myself, by laying my system before the public. Having pursued the plan above 17 years, I am enabled to appreciate its full value, and, being perfectly satisfied of its superior excellence, I hope to continue the same as long as I keep horses.

Most people who know me will allow, that horses in my employ enjoy no sinecure places, and few people can boast of their cattle being in better working condition or more capable of laborious undertakings than mine.

The loft above my stable contains the machinery for cutting chaff and grinding corn. From this loft each horse has a tunnel of communication with the manger below, and a tub annexed to each tunnel in the loft for mixing the ingredients composing the provender.

There should be no rack in the stable, because this may tempt the groom to fill it with hay, and thus by overloading the horse's stomach, endanger his wind, to say little of its expense and waste, for it is a well known fact, that if a horse has his rack constantly replenished with hay, he consumes and spoils upwards of 30 lbs. per day.

The manger with which the tunnel communicates, should have cross-bars, of firm oak, placed at the distance of ten or twelve inches from each other, to prevent the horse from wasting his provender in search of the grain it contains, and this space between the cross-bars, allows the horse plenty of room to take his food.

The chaff-cutter I make use of, is manufactured by Mr. Wilmott, a very ingenious mechanic, who resides about five miles from Taunton, on the road to Wiveliscombe. He also provides corn-bruisers, of the best construction, and any person keeping three or four horses, will save the prime cost of his machinery the first year of its trial, and the horses themselves, thus fed, to use the language of horse-keepers, will always be above their work.

When the provender is thoroughly mixed in the tub, previously weighing out each ingredient, the mixture should be given in small quantities at a time, many times a day; and at night enough is thrown into the tunnel to last till morning. This process will be found of very little trouble to the groom, who will only have to go into the loft six or eight times a day. As the component parts of the provender are weighed separately for each horse, we are certain he has his just proportion; and I have hereunto annexed my scale of feeding in four classes, for it sometimes happens that some of the ingredients cannot be procured, and at other times that it may be be better to substitute others; but, whatever grain is given, it should always be bruised or coarsely ground, and carefully weighed out; for by weight alone is it possible to judge of the quantity of farinacious substances the horse consumes; it being well known that a peck of oats varies from seven to twelve pounds; consequently, if the provender were mixed by measure there would be frequently an uncertainty as to quantity. Wheat varies from 16 to 12; Barley from 13 to 16; Peas from 17 to 15; Beans from 17 to 15 per peck. And as wheat, beans, peas, barley and oats, are equally good, and of very trifling difference in price when their specific gravity is taken into consideration, I am equally indifferent which grain I use, but I should always prefer boiled or steamed potatoes for hard working horses, to be a component ingredient whenever they can be procured.

As I call all ground or bruised grain, of whatever description, *farina*, it will be so distinguished in the following SCALE.

	Class 1.	Class 2.	Class 3.	Class 4.
Farina, consisting of bruised or ground peas, wheat, barley, or oats, ...	5 lbs.	5 lbs.	10 lbs.	5 lbs.
Bran, fine or coarse pollard, .	—	—	—	7 lbs.
Boiled or steamed potatoes, mashed in a tub with a wooden bruiser, ...	5 lbs.	5 lbs.	—	—
Fresh grain, ...	6 lbs.	—	—	—
Hay, cut into chaff, ...	7 lbs.	8 lbs.	10 lbs.	8 lbs.
Straw, &c., in chaff, . . .	7 lbs.	10 lbs.	10 lbs.	8 lbs.
Malt dust, or ground oil cake,	—	2 lbs.	—	2 lbs.
Salt, ...	2 oz.	2 oz.	2 oz.	2 oz.

By the above Scale it will be seen, that each horse has his 30 lbs. of provender in 24 hours, which I maintain, is full as much as he can eat. The two ounces of salt will be found an excellent stimulus to the horse's stomach, and should, on no account, be omitted. When a horse returns from labour, perhaps the groom will see the propriety of feeding him from his tub more largely, in order that he may be the sooner satisfied and lie down to rest.

Whenever oat straw can be procured, it is generally preferred; and some like to have it cut into chaff without threshing out the oats; but this is a bad plan, for in preparing a quantity of this chaff, unequal proportions of oats will be found in each lot, so that one horse will have too large a portion, whilst others have less than they ought, although the portions are accurately weighed.

The only certain method, then, is, to let the grain, of whatever description, be weighed separately from its straw, and the keeper of cattle will soon satisfy himself that his cattle are in want of nothing, in the feeding line. Many people object to potatoes, and think them unfit for working horses; but, from many years' experience, I am enabled to recommend them as a constituent part of the 30 lbs., and am convinced, that it is as wholesome and nutritious a food as can be procured for labouring horses, which are called upon sudden emergencies, to perform great tasks, as has been abundantly proved by Mr. Curwen, M. P., who kept above one hundred horses on potatoes and straw, and always found that their labours were conducted better on this than any other food.—See Curwen's Agricultural Hints, published 1809.

Wiveliscome, Somerset, Sept. 12, 1836.

Foreign Agriculture.

[FROM THE GENESEE FARMER.]

All accounts from abroad agree in representing the amount of surplus grain on hand in the principal countries of Europe, as immense. In the north of Germany, on the Baltic, in Holland and Belgium, in France, Spain, Italy, and the countries bordering on the Mediterranean, in the south of Russia, bordering on the Black Sea, the crops for the last two or three years have been such as to leave a large quantity for export, after supplying the demand for home consumption. These countries have for many years furnished large supplies of bread stuffs to England, which though very fruitful in wheat and barley, has rarely produced enough to supply her immense population engaged in manufactures, and her army and navy.

The countries we have mentioned, cannot be considered more favorable to the production of wheat than our own, and several circumstances may be pointed out, that have contributed to the present accumulation of that article. The first of these causes is the state of profound peace, which, with the exception of Spain, reigns over the whole of Europe. The consequence is, that the multitudes of armed men have turned their swords into ploughshares, and are employing themselves in agriculture, instead of the murder of mankind; and it is well known that much less is required to support a hundred thousand men in the peaceful pursuits of home, than in the field. Another cause is in the fact, that the greater part of the field labour in the countries of continental Europe, is performed by females. In some of them such has been always the case; in others, as in France, it is the natural result

of the conscription and the constant drain of men for the wars in which that country was involved from 1792 to 1814. A third cause is found in the ease with which life in the south of France, Spain, and Italy, is supported. In these countries there is not one-fourth of the meat and bread consumed by the same amount of population, that there is in England, and the north of Europe, or with us. Their genial climate enables them entirely to dispense with many things here considered indispensable; fruit, of various kinds, (and no part of the world produces finer or more durable varieties,) constitutes their principal food for a large part of the year; and hence, when a crop of wheat is raised, the most of it can be spared for exportation.

The causes we have mentioned will, doubtless, continue to operate, so long as Europe shall remain at peace; and in France, the improvement of the methods and the profits of agriculture are increasing with a rapidity elsewhere unrivalled. France has been favoured with a number of literary men, who have not thought it beneath them to devote their great learning and talents to the promotion of agriculture, and the government has not hesitated to second their investigations and efforts in the most praiseworthy manner. Of these men it is sufficient to mention Chaptal and Cuvier. The consequence has been, that France, in the production of the necessaries or the luxuries of life, is far ahead of any country in Europe, England excepted; and we somewhat doubt whether even this exception would be just.

While the present causes which have contributed to throw such an amount of labour into the agricultural department in Europe, shall remain operative, American farmers, notwithstanding the protecting duty of twenty cents per bushel, will find all their exertions necessary to retain their ascendancy in our home markets; and that large quantities will find their way hither the present season, in consequence of present high prices, there can be no doubt. That such an event is possible and probable we are pleased to believe,—the balance of trade will be preserved, and the oppression of the unfortunate poor, which might otherwise have taken place, be rendered impossible.

In most of the European countries, the methods of farming are most defective, and were not labour so plentiful, their fields would hardly repay the expense of cultivation. In that admirable work, "A year in Spain: by a young American,"—we find the following description of the manner in which threshing is performed in that country. He was in the vicinity of Grenada, in the time of wheat harvest, when he says: "I abandoned my donkey to follow the progress of the caravan alone, and turned aside to a spot where a group were busy in threshing out the grain. Touching my hat, and saluting them after the fashion of the country, I paused awhile to observe their labours. A circle about fifty feet in diameter, had been cleared in the centre of the field, and trodden smooth by horses. Here the sheaves were unbound, and five or six horses, which had been unshod for the purpose, and tied together by the heads, were led over the grain; the inner one being fastened to a stake in the centre of the circle, of which they continued to make the circle until the grain was separated, when it was afterwards cleaned from the chaff by throwing it from heap to heap, under the action of a breeze. The straw, after the grain is removed, is once more thrown into the circle, and the horses, being attached to a species of sled, which rests upon a great number of iron runners, are driven round as before by a man who sits upon the sled, until the straw is cut into pieces. This straw is of universal use in Spain as fodder,

and with beans and barley forms the chief nourishment of horses, mules, and asses."

From the total absence of any machinery for cleaning grain in the country, it is probable the Spaniards have the same horror of all innovations, attributed by Scott to his old woman, in one of the Tales of my Landlord, who charged as a capital crime upon one of the innovators on ancient usages, "that he had manufactured wind for his own use, instead of waiting until it pleased the Lord to send it upon the sheeling hill." G.

On the Culture of Rye.

[FROM THE FARMER'S LIBRARY.]

There is no difference between what is called winter and spring rye. Winter rye, by sowing it later and later each year in the fall, will acquire a habit and quality by which it may at length be sown in the spring, and then it is spring rye; or take spring rye, and sow it very late in the fall, and then a little earlier each succeeding year, and it will become confirmed in the habit of winter rye.

One circumstance favourable to the cultivation of this kind of grain is, that it will grow year after year on the same soil without exhausting it, provided the stubble be constantly ploughed under, immediately after taking off the crop. Another circumstance peculiar to this plant is, that it will grow very well, and produce the best grain for bread on a thin gravelly soil, and will flourish well too on the richest.

There is an instance mentioned in the Farmer's Assistant of a gravelly soil being highly manured, and sowed with rye, in which the rye was twice successively eaten off close to the ground by sheep breaking in after it had acquired a height of nine inches the first time, and six inches the latter. These croppings, however, only served to make it grow thicker and stronger than before; and when harvested, it produced at the rate of one hundred and twenty-eight bushels to the acre. The author of the above account supposed that the crop would have been lost by lodging, had it not been for the two successive croppings of the sheep, and suggests the expediency of trying similar experiments with wheat.

It has been remarked that winter rye may be sowed early in the spring and used as pasture during the season; and that it may be sown at the usual time, and serve for a sheep pasture a while during the next spring, without injury to the crop. It may also be mowed for hay two or three times during the summer, when sown in the spring. But in such culture, the ground should have much more seed than the usual allowance, which for early sowing in the fall is about a bushel to the acre, or a bushel and a half for later sowing. Spring rye, it is believed, should have this latter allowance, and be sowed as early as the ground can be well prepared.

Rye, that is intended for family use, should, if the weather will admit, be harvested even as early as when the rye is yet in the milk, and left to lie on the ground for some days to dry and harden. By such management the grain will make a much whiter flour, though perhaps not quite as heavy as when it stands till it is fully ripe.

When rye is sown successively on the same soil, the stubble should be ploughed under as soon as the crop is taken off, which helps to improve the ground, and serves to destroy the seeds of weeds. It should

then lay until about the first of September, then ploughed again, and the next crop harrowed in. Some have supposed that in this way the crops will increase in quantity.

Rye is subject to a distemper, called the spur. The grains, which are affected with it, are larger than the rest, mostly crooked, bitter to the taste, projecting beyond their husks, dark coloured, rough, and deeply furrowed from end to end. This kind of diseased grain sometimes proves very destructive to those who eat it. In some parts of France, where the disease prevails most, the peasants who eat it are liable to be attacked with a dry gangrene in the extreme parts of the body which causes those parts to fall off, almost without pain. "The Hotel Dieu at Orleans," says Duhamel, "has had many of these miserable objects who had not any thing more remaining than the bare trunk of the body, and yet lived in that condition several days." It is not every year that the spur produces these effects, and it is said that if the grain be kept a certain time before it is eaten it will not be hurtful. It is thought, however, that no very bad effects have been known in this country from eating this kind of rye.

When we consider that rye flour mixed with corn meal makes a wholesome and valuable bread, and can be raised on light soils, which under some circumstances may be devoted to that crop, better than to any other; and when it is considered too, that it is not an exhausting crop, the raising it cannot be considered an unimportant article of domestic economy.

On the difference in the effect of Dung upon different Soils—and upon the same Land before and after it has been Limed.

[FROM THE FARMERS' REGISTER.]

[The following communication is from the aged and venerable farmer who has been sometimes honoured, and not undeservedly, by the name of the "Father of Scottish Husbandry"—and it deserves attention, not only for the truth and value of the opinions it conveys, but for the novelty and rareness of their appearance. So far as we know, this is the only instance, before the first publication of the *Essay on Calcareous Manures*, (and this was not known until after that publication,) of its being maintained by any book or writer, that natural poor soils cannot be profitably and durably enriched by dung alone, until after they have been limed. The deductions from Mr. Dawson's statements accord entirely with the opinions maintained in the work referred to, as to the effects of manure on poor soils.]—*Farmer's Register.*

That dung produces much greater effect upon good, than upon bad land, when in tillage, is generally known, though not so fully attended to as it ought to be; but the difference in its effects upon different kinds of land, when in grass, though much more considerable, has been very little observed; notwithstanding it is obvious that the dung of animals has a great effect upon all pastures which consist of what are called the finer grasses; that it has scarcely any upon land that is covered with bent-grass, or fog; and that it is of more or less value upon pasture as herbage of the former or latter description predominates.

As accidental circumstances directed my attention more particularly to these consequences, it may be of use to publish an account of them

in your magazine, so far as they have been ascertained by my own experience: since it may induce some of your readers to communicate other facts and observations illustrative of this important subject.

In the year 1754, having occasion to carry a quantity of very fine black loam from a head ridge of old infield land, to give the surface water a free passage, it was laid upon outfield benty grass land adjoining, of which it covered about a quarter of an acre fully one inch thick. No grass seeds were sown upon this new covering; yet white clover and other fine grasses sprung up and gradually increased upon it; and the bent, upon which the loam was laid, diminished so speedily, that very little of it remained in the third year thereafter.

A few years after this, having a considerable extent of outfield land in fallow, which I wished to lime previous to its being laid down to pasture, and finding that I could not obtain a sufficient quantity of lime for the whole in proper time, I was induced, from observing the effects of the fine loam upon the surface of similar soil, even when covered with bent, to try a small quantity of lime on the surface of a part of this fallow, instead of a larger quantity ploughed down in the usual manner. Accordingly, in the autumn, about twenty acres of it was well harrowed, and then about fourteen Winchester bushels only of unslaked lime was, after being slaked, carefully spread upon each English acre, and immediately well harrowed in. As many pieces of the lime, which had not been fully slaked at first, were gradually reduced to powder by the dews and moisture of the earth—to mix that with the soil, the land was again well harrowed, in three or four days thereafter. This land was sown in the spring with oats, with white and red clover and rye grass seeds, and well harrowed without being ploughed again. The crop of oats was good; the plants of grass sufficiently numerous and healthy; and they formed a very fine pasture which continued good until ploughed, and years after, for corn.

About twelve years afterwards, I took a lease of the hilly farm of Grubbet: many parts of which, though of an earthy mould tolerably deep, were too steep and elevated to be kept in tillage. As these had been much exhausted by cropping, and were full of couch grass, to destroy that, and procure a cover of fine grass, I fallowed them, and laid on the same quantity of lime per acre,—then harrowed, and sowed oats and grass seed in the spring; exactly as in the last mentioned experiment. The oats were a full crop, and the plants of grass abundant. Several of these fields have been now above thirty years in pasture, and are still producing white clover and other fine grasses; no bent or fog has yet appeared upon them. It deserves particular notice that more than *treble* the quantity of lime was laid upon the fields adjoining of a similar soil, but which, being fitter for occasional tillage, upon them the lime was ploughed in. These fields were also sown with oats and grass seeds. The latter throve well, and gave a fine pasture the first year; but afterwards, the bent spread so fast, that, in three years, there was more of it than of the finer grasses.

In all these instances where the lime was only harrowed in, and not ploughed down, the land not only continued to produce the finer grasses, but the dung of the animals feeding upon them had the same effect in increasing the quantity and verdure of the grass, as it has upon rich, loamy, infield soils; of this, the parts of Grubbet hills, above alluded to, afford a full proof at this day. Whereas, wherever the lime was ploughed down, the parts of the soil at the surface, which were not sufficiently mixed with lime, though sown with clover, be-

came gradually covered with bent; and dung of animals had little or no effect upon such benty parts. That animal dung has little or no beneficial effect upon such pastures, is obvious from this circumstance, that, in all hilly countries there are great tracts of benty grass land, which have continued for centuries, though constantly pastured with sheep or cattle, without any visible improvement; the animal dung neither increasing the quantity, nor improving the quality of the pasture. But it is still more remarkable, that dung has no permanent effect upon such soils, even when ploughed down, as appears from the following facts.

In the year 1756, about five acres of earthy outfield benty land were folded with sod-dikes, and very well dunged, with the intention of ploughing it for oats; but upon determining afterwards to enclose about sixty acres to be contained in pasture, of which those five acres made a part, the intention of ploughing these folds was given up, and the dikes were thrown down in the spring, well harrowed and sown with rye grass. The effect of the dung upon that land was very considerable the first year, a great deal less so the second, very little the third, and was not visible afterward. Seven years thereafter, it was ploughed with oats along with the rest of the field, when the effects of the dung were expected to be considerable; but the crop was no better upon the folded part, than upon the others, nor was it any better upon the sides of the sod-dikes, where the dung had been at first fully covered in by the earth of the sods.

Some years afterwards, about ten acres of benty outfield was fallowed, and intended to be limed; but, for particular reasons, no part of it was limed. One half of it, however, was dunged from the farmyard. The whole field was sown with oats and rye grass seeds. The crop of oats was much better upon the part that was dunged, as was also the rye grass, the first year; but the bent spread so fast upon both parts, that no rye grass was left the fourth year, nor was there any greater verdure upon the part that was dunged than upon the other part. When the whole field was ploughed some years after, there was no visible difference in the crops between the two parts: the crop upon both was very bad.

But from the following facts it appears, that upon that sort of soil, when properly mixed with lime, the effects of dung are not only greater, but much more permanent, whether under tillage or pasture. After laying at least fifty bushels of unslaked lime upon each English acre of the dry benty land of the farm of Frogden, I cropped in what was then called the Norfolk rotation, viz: 1st year, Turnip; 2d, Barley or Oats; 3d, Grass; and 4th, Oats or Wheat. It was expected that this mode of cropping would not exhaust the land; but I found, even in the second round, that the crops were so very much worse on the thin soils, that it was necessary to allow the land to continue some years in pasture to recover its fertility; and for that purpose it was sown with equal quantities of red, white, and yellow clovers, with a small portion of rye grass seeds. As the land had been twice fallowed, and carried three crops of turnips, horse-hoed after liming, and had never been ploughed deep, the surface soil was well mixed with lime, and accordingly the clover was not afterwards injured by the native bent. But as the land had been exhausted by cropping, sheep were folded upon it in nets the first summer. Their dung greatly increased the quantity and richness of the pasture; and though the effect was less the next year, it continued to be considerable, and the pasture

seemed still improving after the third year. After being six years in grass, the land was ploughed up, and produced full crops. As the soil of the fields treated in this manner was in every respect similar to that of the five acres which were folded in 1756, and to the soil of the field of ten acres, half of which was dunged from the farm-yard, as already mentioned, the very great superiority in the permanency of the effects of dung in the latter instance, over that in the two former, can only be imputed to the lime.

From the preceding statement, the following conclusions deserve the attention of agriculturists.

1st. That animal dung dropped upon coarse, benty pastures, produces little or no improvement upon them; and that, even when sheep or cattle are confined to a small space, as in the case of folding, their dung ceases to produce any beneficial effect, after a few years, whether the land is continued in pasture, or brought under the plough.

2d. That even when land of this description is well fallowed and dunged, but not limed, though the dung augments the produce of the subsequent crop of grain, and of grass also for two or three years, that thereafter its effects are no longer discernible, either upon one or the other.

3d. That when this land is limed, if the lime is kept upon the surface of the soil, or well mixed with it, and then laid down to pasture, the finer grasses continue in possession of the soil, even in elevated and exposed situations, for a great many years, to the exclusion of bent and fog. In the case of Grubbet hills, it was observed, though more than thirty years have now elapsed. Besides this, the dung of the animals pastured upon such land, adds every year to the luxuriance, and improves the quality of the pasture, augments the productive powers of the soil when afterwards ploughed for grain:—thus producing upon a benty outfield soil, effects similar to what are experienced when rich infield lands have been long in pasture, and which are thereby more and more enriched.

4th. That when a large quantity of lime is laid on such land, and ploughed down deep, the same effects will not be produced, whether in respect to the permanent fineness of the pasture, its gradual amelioration by the dung of the animals deposited on it, or its fertility when afterwards in tillage. On the contrary, unless the surface is fully mixed with lime, the coarse grasses will, in a few years, regain possession of the soil, and the dung thereafter deposited by cattle will not enrich the land for subsequent tillage.

Lastly, It also appears from what has been stated, that the four-shift husbandry is only proper for very rich land, or in situations where there is a full command of dung: That by far the greatest part of the land of this country, requires to be continued in grass two, three, four, or more years, according to its natural poverty: That the objection made to this, viz: that the coarse grasses in a few years usurp possession of the soil, must be owing to the surface soil not being sufficiently mixed with lime, the lime having been covered too deep by the plough.

There are other manures besides lime, which to a certain degree produce similar effects, upon which some observations may be offered at a future opportunity. I am, sir, yours, &c.

WILLIAM DAWSON.

Edinburgh, March 2.

Short Hints on Manures, and their comparative value.

[FROM THE GENESEE FARMER.]

A few brief remarks on the different kinds of manure, their comparative value, and peculiar adaptation, may perhaps be acceptable to our readers, by laying before them at one view some of the chief facts which are contained in many extended articles.

Stable and farm-yard manure.—This may be applied with great advantage to all kinds of soils, the quantities varying with the previous fertility and the kind of crop intended to be raised. It should in all cases be applied with lime, or on land that has been limed. On sour and thin light soils, lime with it is absolutely necessary. It may be applied almost without limit to all crops where leaves and stalks are the chief product; but where seed is the intended crop, more caution is required in using it. Colman says, "A good farmer should look upon manure as money which he may place at compound interest, the payment of which he is sure." No pains should be spared to collect and save it. All that can be obtained from stables and cattle yards should be preserved and applied. Straw and other litter should be used as plentifully as can be, in order to absorb and retain the liquid parts and increase the bulk, but without rendering the mass too dry. Open cattle yards should be made lowest towards the middle, in order to prevent the juices from being carried off by rains, and care should be taken that no water may run upon it from higher adjoining ground. The yard should therefore be so situated that the ground may descend every way from it; or else an open drain should run round it, to prevent the water flowing into it in time of showers.

This kind of manure should be applied to the soil, where possible, in the earliest stages of fermentation. If allowed to ferment, fifty per cent. of its value will be lost. For this reason, when drawn upon the ground, it should be ploughed in immediately; or if this cannot be done, it should be left in heaps so small as to prevent fermentation from going on. Such heaps will be most convenient for spreading. The only case in which manure is best when applied after it has fermented, is where immediate and intimate admixture with the soil is required, as for some garden crops. When it is left to ferment in a heap for this purpose, the volatile parts, which are those commonly lost, may be preserved by covering the heap a few inches thick with muck or marsh mud, (rich soil will do,) and this with a thin coat, say half an inch, of lime. This will absorb and retain the vapour, and leave the quantity of fermented manure as great as if this care was not taken.

Clover, and other green crops.—Ploughing in crops while in a growing state, has been productive of the greatest benefit, particularly on light and friable soils. Lorrain states that he purchased an exhausted farm in Pennsylvania, and by pursuing this mode of renovating, he so improved it, that in a very few years he more than quadrupled his crops. Many instances of similar success have occurred in our own State. This method of manuring is not so well adapted to heavy soils, unless the ploughing in can be done while the ground is dry, that the decomposition may not be retarded. Clover, peas, and beans are the best crops for this purpose; but as buckwheat is easily raised, and a heavy growth soon obtained, it has been found very advantageous. They should be turned in, either at or immediately after the most lux-

uriant stages of growth, in order that their decomposition may be more complete.

The chief economy of this mode of manuring is, that it saves drawing and spreading, and the labour of preparation, which in other sorts of manure is always considerable. The only additional expense is in the use of the land, and in sowing the crop. Where land is cheap, and farm yard manure not easily obtained, it possesses advantages over every other mode practised.

Greensward, or decayed roots of grass.—This possesses the advantages peculiar to those green crops, though not in so great a degree. Like most other manures, of which the value depends on fermentation, a great part of its fertilizing part is wasted unless it ferments in the soil; the sod should therefore not be turned up to the air after it has been inverted, until thorough decomposition has taken place, which will require at least one season.

Muck and marsh mud consists chiefly of decayed vegetable matter, and may be applied with advantage to every soil where such matter is not already abundant. Lime should be applied with it.

Straw and leaves are used to best advantage when mixed with stable and barn yard dung, which in its action upon them, breaks their fibre, and reduces them to a proper state to become mixed with the soil; while they in turn absorb the enriching juices, and prevent their wasting.

Weeds, if removed from their place of growth while in a green and succulent state, and piled in a heap, will ferment and form excellent manure. If left to become mature, their seeds will be scattered, and their value as manure decreased many fold. Pastures are frequently permitted to become overrun with mulleins and thistles, and if instead of suffering them to become ripe, they were cut while green, and raked with a horse rake in heaps, it would be a great saving on every hand.

Charcoal absorbs many times its own bulk of most of the different gases, and hence may yield a great supply of nourishment to plants. Another profitable use for it is as a surface dressing for early crops, and those which require warmth of soil, as it absorbs very freely the heating rays of the sun.

Bones, broken or pulverized, horn shavings, waste locks of wool, hair, &c., all possess very fertilizing powers. Experiments with these substances, in this country, have been comparatively limited. In an experiment of John R. Watson, of Perth Amboy, with bone dust, who applied it to corn in the drill at the rate of sixteen bushels to the acre, it exceeded in its effects high manuring with yard dung or with fish. Bones, broken fine, are applied with great effect to grass lands. In Scotland, where bone manure is much used, it is highly esteemed as manure, and has commanded a price of three shillings and sixpence sterling per bushel. It is said to be best for light and dry soils, and not of great value upon clays and heavy loams, yet J. R. Watson states, that he used it both on light and heavy loams without any perceptible difference in its effects. On thin sand lands it is said to be invaluable. It does not in general produce much effect the first year, unless it has been fermented before application to the soil; this process is effected by mixing it in a heap with ashes, and moistening the whole with water. The quantity applied in ordinary cases should not be greater than from twenty to forty bushels per acre; as in other manures, however, a much greater quantity than otherwise may be used where the intended crop is to be leaves and stalks, and not seed. Horn

shavings, refuse wool, &c., possess a fertilizing power little if any inferior to that of bones. It is the small quantity needed to produce a given effect, that renders manures of this class so remarkable; they appear to possess an enriching effect within a small compass, many times greater than the same quantity of farm yard-dung.

Lime and Marl.—These may be applied with great advantage to all soils which do not effervesce with acids. On worn out sandy land which has become sour, (which is indicated by the growth of sorrel, scrub pines, or broom grass,) they operate like magic; by their use on such lands in Virginia, they have speedily been converted from barrenness to fertility. But there are few soils which may not be greatly benefited by them. A correspondent of the Poughkeepsie Telegraph, of last year, sowed twenty-five bushels of lime to the acre, and harrowed it in with wheat; it had but little effect on the first year's crop, but the second year, the clover which was sowed among the wheat grew much larger on the limed ground, and endured the drought better, than on the unlimed; the third year it was ploughed, and planted with corn; when this was half grown the difference produced by the lime was very perceptible, by the stalks and leaves being larger, and a very dark green, and the crop was one third greater in consequence. Many other experiments might be mentioned where similar results were produced. Lime should always be present where barn-yard manure is applied, as it performs a most important office in fixing the volatile parts of such manure until they are immediately wanted by plants during their growth. It is believed that by its operation in this way, the most important improvement may be made in the culture of wheat, as it tends to prevent too great a growth of straw, and to promote a growth of seed, so that a more copious application of manure is admissible. The quantity of lime to be applied must vary with the fertility of the land; the poorer the land, the less lime it will bear. Forty or fifty bushels to the acre would in common cases be enough to begin with. It is of little consequence whether the lime is fresh slaked, or old, when it is applied. Hot or magnesian lime must be applied with greater caution and in smaller quantities than common lime; it is rendered mild most easily by spreading it upon grass land a year or two before breaking up the sod. Tennant found by experiment that thirty or forty grains of pure lime did not retard the growth of seeds more than three or four grains of calcined magnesia. Shell marl operates in precisely the same way as old lime.

Ashes, soap suds, &c. produce a good effect, the potash they contain apparently performing the same office as lime.

Durability of Wood.

[FROM THE GENESEE FARMER.]

The subject of the durability of different kinds of wood when exposed to the action of air and moisture, though one of great importance to the farmer, and the public at large, does not seem to have received that degree of attention and elucidation it deserves. The Teak tree *(Tectona grandis)* of the East Indies, and the Live Oak *(Quercus virens)* of our southern forests, appear to be nearly indestructible when employed as timber, and in naval architecture. But these from their natures cannot be cultivated in the northern States, and we must seek in our forests, trees which shall approach or rival the above in excel-

lence and durability. Fortunately these qualities are found nearly in perfection in the Yellow Locust, *(Robinia Pseudacacia,)* and the Red Cedar, *(Juniperus virginiana,)* and in a lesser degree in many others, a knowledge of the comparative durability of which, properly ascertained, would be of essential service to the public.

Thirty-two years since, in enclosing some newly cleared field, we had occasion to set some bar posts, and at a point where four fields cornered we placed one so that it served for four pair of bars, one to each field. The post was the common white cedar, *(Cupressus Thuyoides,)* cut from a thrifty tree fourteen inches in diameter, the holes on the four sides cut in the usual manner with a narrow axe, the bark stripped from the whole, and the large end set two feet in the earth, which at that place was rather moist. After standing more than twenty years, or until the basswood fences with which it was connected had rotted down, it was removed to another position, where it has since served for two pair of bars and one gate. At the time of removal it appeared quite sound, and present appearances indicate a duration of another twenty years at least. From our experiments we are convinced, that large posts are far more durable than small ones, and that those which occupy the whole diameter of the tree, are better than sawed or quartered trees of equal size.

In the Railroad Journal, in an article on the advantages of lime as a preservation of timber, the following instance of its effect on the durability of the White Pine, *(Pinus abies,)* is given. The planks were a parcel of pine planks used as a platform on the ground, on which to make lime mortar. This platform was laid by the informant's grandfather, in a corner of the yard, and used every year more or less for the purpose of a mortar bed. His father continued it in the same use; himself, the grandson, continued it for a time, as long as he had occasion, after which it lay some years unused, and overgrown with grass and weeds. At length, wanting the ground for another purpose, he had it torn up, and removed, expecting to find the planks entirely rotted, but to his surprise found them sound, and, to use his own forcible expression, "as hard as a bull's horn." This was after they had lain exposed to all the vicissitudes of the atmosphere, and in contact with the surface of the earth, about sixty years.

In the year 1800, a Mr. Atkinson, in the employ of the Hudson's Bay Fur Company, discovered an old Factory Island, in James' Bay, a Branch of the Hudson's Bay, a cedar post, about a foot square, and five feet high, on which the following inscription had been cut, and all the letters of which were distinctly visible: "In the year 1692 wintered three ships at this Island, with one hundred and twenty-seven men, under the government of Captain Ganes, Knight. Then we erected this monument in remembrance of it."

This furnishes the greatest instance of duration of timber set in the earth, and constantly exposed to atmospheric influences, we have any where noticed, and we believe there are few kinds of timber which would endure so long. This notice does not state the kind of cedar employed, but from its frequency on those islands and coasts, there can be no doubt of its being the red cedar, a kind which, as stated above, is almost imperishable.

Next to the kinds above stated, rank in durability the various kinds of pine and spruce; the white oak, chesnut, red elm, black walnut, and red beach, all furnishing timber of good quality, but not such as will, like the above, resist for a long period the attacks of time.

PART III.

MISCELLANEOUS INTELLIGENCE.

Cochran's Many-chambered Non-recoiling Rifle.—This extraordinary invention of a young American, native of New-Hampshire and which is now being for the first time exhibited to the public, at the Fair of the American Institute, Niblo's Garden, deserves more than a passing notice. There are circumstances connected with it, which give it a peculiar, if not romantic, interest in the history of the arts in our country. If any thing were wanting, amidst the multitude of extraordinary inventions which have, for the last half century, been recorded in the archives of our patent office, to illustrate and establish the pre-eminent claims of our countrymen to genius of a high order, it would be that which forms the particular subject of our remarks.

Mr. Cochran's father was a lawyer, and afterwards a merchant of eminence in Enfield, New-Hampshire; and the son, John Webster Cochran, was born there, and has invented the species of fire-arms in question, was brought up to no particular business. At the very early age, however, of sixteen, he discovered a strong taste and passion for mechanical experiments, and was constantly occupied in the construction of machinery, which his father approving of, unlike many other fathers, encouraged, and to further the wishes of his son, expended several thousand dollars in his behalf, in the cost of the different kinds of apparatus required.

When only eighteen he made the discovery in question, but did not perfect it until three years after. He then went to France and England, and exhibited his model cannon to Louis Philip and William IV. While at Paris, in 1833-'4, he was requested by the Turkish Ambassador to explain it to the Turkish Minister at London, and accordingly went to Woolwich, and performed a series of experiments before the latter personage, which gave so much satisfaction, that he urged Mr C. to visit the Sultan, at Constantinople, and for that purpose provided him with the most flattering recommendations to the Court of the Sublime Porte. Mr. Cochran arrived at Constantinople, February 11, 1836, was received with great distinction, and introduced to the Sultan by the Grand Vizier. His Turkish Majesty was highly pleased with the experiments made with the model, told Mr. C. he was satisfied it would be generally adopted, and requested him to cast twelve-pounders on the same principle. He was provided with elegant apartments at Pera, raised to the dignity of Master of Cannon, and furnished with as many workmen as he required for the accomplishment of his task. The treatment, in fact, which he received, was equivalent to that of the rank of an ambassador.

Mr. Cochran, however, finding there was no good foundry or mechanics, was obliged to undertake the work with his own hands; and though not brought up to the business of making machinery of any kind, by dint of much labour and perseverance made himself all the necessary implements, the augers and the wooden apparatus for boring with horse power, and the preparations required for procuring the proper castings. By good fortune, he succeeded entirely to his wishes, and cast and bored three cannon, two of one pound each, and third a twelve-pounder, which last was finished in a style as perfect as he could have desired. On the 14th September following, he proved this last piece to his entire satisfaction, in the presence of all the chief officers of the Turkish Government, who were delighted with its execution, and made a highly flattering report to the Sultan. He fired out, in the presence of those officers, to their utter astonishment, 100 times in fifteen minutes. The Sultan, when he heard of it, would scarcely believe it, and directed Mr. C. to perform the same experiments in his presence. The most extensive preparations were accordingly made for this important trial, which was to take place at Tarache, on the European side of the Bosphorus.

No less than 30,000 troops were assembled at this spot. The Sultan, at the hour appointed, came over from his summer residence on the Asiatic shore, rowed in one of his splendid *caiques*, and preceded by a long line of other boats, of the same description. The one which announced the approach of the Sultan was manned by 40 oarsmen, and came with more lightning speed than that in which his august highness himself was seated. As the latter was seen nearing the

wharf, Mr. Cochran, at the suggestion of Halid Pacha, the Sultan's son-in-law, and commander of the land forces, fired off a salute of twenty-one guns (the customary number) with the experimental cannon, which consumed less than two minutes, and struck the assembled multitude with amazement. As the Sultan at this moment stepped on the wharf, Halid, accompanied by the Grand Vizier and other dignitaries, ran to his majesty, and the former making the usual salaam of kissing the sultan's foot, announced to him with feelings of exultation that could scarcely be repressed, the wonderful success of the machine cannon, as they appropriately named it. The Sultan arrived at his tent, and then sent for the *Master of the Cannon*, the title which was given to Mr. Cochran, and after a short conversation with him, in which Mr. C. conversed chiefly in the Turkish language, which he had partially acquired, the Sultan renewing his expressions of kindness, requested him to perform the experiment in his presence. His majesty placed himself within a few feet of the piece, and Mr. Cochran commencing rather sooner than was anticipated, the Sultan then with his back towards the cannon was at first somewhat startled at hearing the explosions suddenly succeeding each other with such inconceivable rapidity. The cannon was fired 100 times as before in fifteen minutes, during which the barrel acquired 650 degrees of heat, while the revolving cylinder which cantained the charges was comparatively cool, being 250 degrees of temperature only. The Sultan's exclamation expressive of his delight was 'God save the Americans—if such boys as you are (Mr. C. being then but 21) can invent such things, what can your men do?'

He then asked for the bill of expense, and being told by Mr. C. it was left to his own pleasure, he went the next day, at the request of the Sultan, to visit him at his palace. The bag of gold he there received was truly an imperial present, and enough to make his fortune. The amount would scarcely be believed should we name it, and we do not feel ourselves authorized to specify the sum more distinctly, than may be inferred from what we have said.

Mr. Cochran soon after returned to America, with the understanding that he should have a contract for supplying a number of cannon, of the pattern exhibited, whenever it should be agreeable to him to execute it.

These adventures of Mr. Cochran, yet a youth, seeking in a foreign land that patronage and encouragement which were the proper measure and appreciation justly due to his pre-eminent talents, and which it is lamentable to be obliged to confess his own countrymen would not have bestowed upon him, recall the similar examples of West, Fulton, Perkins, and others, and are calculated to reflect discredit upon our national reputation, inasmuch as Americans ought to be the first to reward those inventive powers which are so emphatically choracteristic o as well as honorable to, the genius of our people.—*New-York Star.*

To fatten Fowls or Chickens in four or five days.—Set rice over the fire with skimmed milk, only as much as will serve one day Let it boil till the rice is quite swelled out; you may add a tea-spoonful or two of sugar, but it will do well without. Feed them three times a day in common pans, giving them only as much as will quite fill them at once. When you boil fresh, let the pans be set in water, that no sourness may be conveyed to the fowls, as that prevents them from fattening. Give them clean water, or the milk of rice, to drink; but the less wet the latter is, when perfectly soaked, the better. By this method, the flesh will have a clear whiteness which no other food gives; and when it is considered how far a pound of rice will go, and how much time is saved by this mode, it will be found to be cheap.—*N. E. Farmer.*

To give lustre to Silver.—Dissolve a quantity of alum in water, so as to make a pretty strong brine, which must be skimmed very carefully; add some whiting to it, and when you wish to use it, dip a piece of linen rag in it, and rub over the plate.—*Yankee Farmer.*

Sir Walter Scott, in one of his letters, lately brought to light, alluding to his fondness for planting and agriculture, playfully says, "I promise you my oaks will outlast my laurels; and I pique myself more on my compositions for manures, than on any other compositions whatsoever, to which I was ever accessory.

An excellent and cheap way of Manuring Corn.—Plough up your ground intended for corn in the fall of the year, as you can plough it; let it lay till spring, at the opening of which, when the frost is entirely out of the ground, give it a good ploughing, and harrow it down. It is then in good order for preparing to plant. Take of slaked ashes two thirds, and of ground plaster one third; mix them well together, and follow the droppers, and put as much of this mixture on the seeds as you can grasp in your hand, and cover it well over in the usual way. The corn

will grow off finely, and retain a strong vigorous growth and green colour, and stand the drought much better than upon the strongest culture. The writer of this having tried the experiment for two years has fully tested its value.

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Beet Sugar.---Pennsylvania takes the lead in introducing the sugar beet, and agents are now in France from that State procuring seed and collecting information. A gentleman who has been conversant with the rise and progress of this production in Europe, says, that as to climate, a northern latitude is found to suit this plant best. The north of Germany, Prussia, and Siberia, the countries where this new application of it was first made, are more favourable to it than the northern department of France, as experiment has amply established, and the trial of it in the south of France, has constantly failed, though it was at first supposed that this root would, as well as other productions, contain a larger proportion of saccharine principle than those of colder countries. This hypothesis, founded on a mistaken analogy supposed to exist between plants growing above, and below the soil, proved, as might have been expected, completely fallacious, and the culture is now given up.---*Newburyport Herald.*

Notice has been officially given in the New York papers, that an application will be made to the Legislature, at the next session, for an act of incorporation for a company for the manufacture of sugar from the beet root, with a capital of five hundred thousand dollars.

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Removal of Fruit Trees.---Fruit trees may be removed and transplanted after the first of October. Most farmers who transplant fruit trees, suffer a great loss by not doing the work well. The principal care needed is, first, to dig the holes large, say six feet across, and fifteen or eighteen inches deep; secondly, to preserve carefully, the roots as entire and uninjured as possible, and not to suffer them to become dry out of the ground; and thirdly, to fill the hole with finely pulverized, rich earth, (not manure,) shaking it in in small quantities, and packing it closely but gently about the roots, so as to leave them in their natural position in the soil. The whole expense of this would not be more than half the price of the tree, and in five years it would be three times the size which it would be if transplanted by the common way of digging small holes, and doing the work hastily and imperfectly.---*Genesee Farmer.*

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Alum Mine discovered in New-York.---A very rich mine, yielding alum in the proportion of two-thirds, and copperas in the proportion of one-third, has been discovered in Chatauque county, New-York.

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Salt made in New-York.---A traveller in the western part of New-York, in speaking of the town of Syracuse, says, that the quantity of fine salt made at that place, during the last year, amounted to 3,000,000 bushels, independently of large quantities of that article in a coarse state. The business this year, he says, yields a nett profit of about nine cents per bushel, and one company alone will make $200,000. A few years since, the site of the present town of Syracuse was a wilderness; now, besides being a place where the products of the rich county of Onondaga are embarked upon the canal, it is the point where five rail-roads will terminate. So much for internal improvements.---*Balt. American.*

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The *Silk Culturist* cautions people against itinerent men who are about the country selling spurious mulberry seed and bartering off Chinese trees. Yankees should be upon the look out, and not let them fleece each other so easy. The sale of trees has become an important business, and of course, with irresponsible men, there can not much be expected in the shape of rigid honesty. Persons in want of trees or seed should apply to men of known character and integrity.

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New Silk Factory.---The new Silk Factory is to commence operations in Dedham this week. When in full operation it will run 1600 spindles, and employ one hundred females.

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Sugar from Indian Corn.---M. Pallis lately presented to the Academie des Science of Paris, a sample of this substance, extracted from the stem of the plant, which has been found to contain nearly six per cent. of sirup boiled to forty degrees, a part of which will not crystallize before fructification; but it condenses and acquires more consistency from that period to the state of complete maturity. The most favourable time to obtain the greatest quantity of sugar is immediately after the maturity and gathering of the fruit. The litter left after the extraction of sugar, is capital to feed cattle or to make packing paper.

To fatten Hogs.---An English farmer fattened eight pigs in the following manner, which may be recommended in cases where a constant and regluar attention cannot be given to feeding the animals. He placed two troughs in the stye; one he filled with raw potatoes, the other with peas, and gave no water. When the pigs were thirsty, they ate the potatoes. In this way it is probable that the animals would not only thrive without water, but would need no antimony, brimstone, nor any other medical substances: for new potatoes being cooling and loosening might serve at once for food and physic. Instead of peas, perhaps dry indian corn, or wheat would be better, indian meal might be substituted. This mode of management with swine was first recommended in the N. E. Farmer, Aug 6, 1826, and has been adopted by a correspondent of the *Northern Farmer*, who directs as follows:

'Shut your hogs up the first part of September; feed them with dry peas, or corn; give them raw potatoes, but no drink. The grain creates an inward fever; the animals being uneasy from thirst, will chew potatoes fine, but chew slow, and get the substance of them as if boiled. This has been my practice for years past. I give them as much grain as they will eat; and after that, each grown hog will eat from 6 to 8 quarts of potatoes per day.'

A Lady clothed in American Silk.—At the Agricultural Exhibition of Merrimack county, Mas., Mrs. Kimble, of Hopkinton, New Hampshire, was present, robed in rich and durable silks of her own manufacture. She raised the silkworms, reeled, twisted, dyed, and wove the silk, and for aught that is known to the contrary, made the garments with her own hands.

Mode of extinguishing sparks in the chimneys of Steam-engines.---A Mr. Gabriel Winter has succeeded in extinguishing all sparks from the chimney of the steam engine, by passing the escape steam into it at a proper distance above the boiler. The vapour entirely extinguishes the sparks.

Bleeding at the Nose.—Bleeding at the nose if it be ever so violent or protracted may be permanently stopped by the individual using some salted dried beef which has been grated fine with a nutmeg or other grater in the same way that he would take snuff; two or three pinches are said to be sufficient to stop any fit of bleeding.

Cure for Warts.—Rubbing warts with muriate of ammonia, will assuredly remove them, without pain or inflammation, unless they happen to be particularly hard. Touching them with nitric acid effects their positive destruction much more speedily, but there is some considerable inflammation accompanying the process. A strong solution of the nitrate of silver, the concentrated acetic acid, and the *tinctura ferra muriatis*, procurable at any druggist's, are each of them remedial agents wholly subduing those unseemly, uncomfortable excrescenses on the hand. So simple and so certain are each of the articles mentioned, that it would be really a pity not to have the fact generally known. When warts become ragged and horney in their texture, they are a constant source of irritation, besides very considerably deforming the hand.---*Scientific tracts.*

Wonderful Effects of Culture.---Many plants that are highly nutritious and useful, under culture, are useless, and even poisonous, when growing in their natural state. The apple is the improvement which culture has produced upon the wild acerb crab. The uncultivated peach is said to be poisonous in some parts of Asia. The cabbage is believed to have sprung from the worthless colewort. The potato is but a small bitter root in its natural condition in the wilds of Chili. Most of the plants which furnish food for man, are multiplied in their products, and greatly improved in their quality, when subjected to culture. Every year brings to our notice some species, hitherto useless, which human industry is rendering subservient to our wants. Providence has bountifully supplied us with the materials necessary to our condition, if we will but prepare them for our use. Industry and perseverance are assured of their reward; and indolence may be sure of meeting the penalty incident to the disobeyance of a reasonable command.

What a beautiful lesson do these facts teach to the young. The wild uncultured mind is like the wild crab, wild potato, or colewort—a comparatively useless or noxious cumbrance in society. And yet, if brought under suitable culture, how useful—useful to its possessor, and useful, like the plants we have spoken of, to the family of man.